ESPON Project 3.2

SPATIAL SCENARIOS AND ORIENTATIONS IN RELATION TO THE ESDP AND COHESION POLICY

First Interim Report

31 May 2004

The content of this report does not necessarily reflect the opinion of the ESPON Monitoring Committee

The present 1st Interim Report of the ESPON Project 3.2 is a team effort of all project partners under the leadership of the
Institut de Gestion de l'Environnement et d'Aménagement du Territoire (IGEAT)
Université Libre de Bruxelles

Contact : Prof. C. Vandermotten
Université Libre de Bruxelles
CP 246 - Bd du Triomphe
B – 1050 Brussels
Tel. +32(0)2 6505078
Fax +32(0)2 6505092
E-mail: cvdmotte@ulb.ac.be

- Co-leader :
  AETS – Agence Européenne «Territoires et Synergies »
  (France)

- Partners :
  BBR – Bundesamt für Bauwesen und Raumordnung
  (Germany)

  CRS- HAS – Centre for Regional Studies of the Hungarian Academy of Sciences
  (Hungary)

  CUDEM – Centre for Urban Development and Environmental Management
  (United Kingdom)

  DIG – Department of Management, Economics and Industrial Engineering, Politecnico di Milano
  (Italy)

  MCRIT
  (Spain)

  NISR – Ruimtelijk Planbureau
  (Netherlands)

  NORDREGIO - Nordic Centre for Spatial Development
  (Sweden)

  UMS 2414 Réseau Interdisciplinaire pour l'Aménagement (RIATE)
  (France)

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Glossary

AMECO Database	Annual macro-economic Database
AON (Assignment)	All-Or-Nothing (Assignment)
CAP	Common Agricultural Policy
CEECs	Central and Eastern European Countries
CORINE	Co-ordination on Information of the Environment
EAGGF	European Agricultural Guidance and Guarantee Fund
EEA	European Environment Agency
ESDP	European Spatial Development Perspective
ETCI	European Territorial Cohesion Index
FUA	Functional Urban Area
GU	Geographical Unit
HDI	Human Development index
INTERREG	Community initiative concerning border development, cross-border cooperation and selected energy networks
ISPA	Instrument for Structural Policies for Pre-Accession
JRC	Joint Research Centre
K+C tool	Knowledge and Communication tool
KTEN	Know trans-European Networks
MASST (model)	Macroeconomic, Sectoral, Social and Territorial (model)
MAUP	Modifiable Area Unit Problem
NEC Directive	Directive 2001/81/EC of the European Parliament and of the Council of 23 October 2001 on national emission ceilings for certain atmospheric pollutants
NIS	New Independent States
NUTS	Nomenclature of territorial units for statistics
NWMA	North Western Metropolitan Area
PHARE	The Phare programme is one of the three pre-accession instruments financed by the European Union to assist the applicant countries of Central and Eastern Europe in their preparations for joining the European Union
RDP	Rural Development Policy
SAPARD	Special Accession Programme for Agriculture and Rural Development
SPESP	Study Programme on European Spatial Planning
STU	Spatio-Temporal Unit
SWOT	Strengths Weaknesses Opportunities and Threats
TENs	Trans European Networks
UTS	Unions Territorial Strategies

1 Executive summary

1.1 Summary of report

1.1.1 Key indicators

The ESPON programme has created a vast amount of data, collected by the different projects, or centrally provided by Eurostat. This data, and the information and analyses derived from it, is beginning to create a very profound and differentiated view of European territories. However, for the data to be usable (and reusable) in a synthetic and prospective way, it will be necessary to choose a series of key indicators amongst all the proposed indicators, and to extend these indicators in time by creating longer time series than currently available.

In order to decide which indicators are key indicators, necessary for the exploration and evaluation of European spatial development and thus for the scenario building process, it is helpful to take a step back and remind ourselves what we actually want to measure (see *Table 2. Indicators from the ESPON database and other suggested key indicators*).

The choice of key indicators is limited, and for some of the topics almost null, as for example for sustainable development (in its environmental sense). Project 3.2 will, therefore, have to partially create its own data sets in order to fulfil its mission of scenario building. Other data sources will have to be tapped. The final choice concerning indicators, however, is dependent on the actual scenarios to be constructed.

1.1.2 Typology of European regions

It is impossible, in the context of the ESPON programme in general and within project 3.2 in particular to evaluate the evolutions of all European regions at NUTS3 or NUTS2 level individually. Generalisations have to be made in the form of typologies in order to develop visions and policy recommendations for certain types of regions. In Lillehammer we proposed a regionalisation of Europe that takes into account economic sectoral structures that often reflect many socio-economic realities of the respective regions. The developed types thus seem a good container for the exploration of spatial developments. These regions are not meant as an exhaustive coverage of European space, but more as functional types which have specific characteristics and, thus, specific futures and needs (see Table 1. Functional regionalisation of Europe). However, the disussions in Lillehammer have shown that in order to construct a meaningful typology of regions, more information concerning the precise nature and content of the scenarios is needed. We thus propose to postpone the decision concerning a typology to a later stage of the project.

1.1.3 ESPON Database

The ESPON database must guarantee a continuous provision of regional and spatial information during the ESPON process, especially thinking of the successive ends of the different projects and in terms of the implementation of the ESPON core indicator list, which includes indicators seen as fundamental for the analysis of spatial structures and trends in Europe. With the end of the projects the maintenance of the ESPON database within 3.2 must concentrate solely on the general indicators provided on the base of the European Statistical System co-ordinated by Eurostat and on those of special project related interests.

The need to maintain and further develop the existing ESPON database in the context of a longer time range and broader spatial coverage in the context of spatial scenarios and the investigation of selected socio-economic trends is obvious. The common framework of indicators agreed upon in the existing 'core indicator list' will be further developed and enriched according to the needs related in this respect.
The project related adjustment of the data base will cover aspect of :
• time (access via single year or time series)
• improved thematic range
• further developed spatial coverage

1.1.4 New database structures for long time series

We will examine the possible solutions that may be applied to existing databases in order to improve their quality and their political significance. In the framework of a partnership between ESPON 3.2 and EUROSCOPE, we propose to realise an experimentation on a new database structure which will apply very strong principle of quality control and offer at the same time pragmatic solutions for the elaboration of long term time series on basic indicators. The crucial challenge of this database is to propose an evolutive database structure which could be improved step by step.

This process is guided by five principles:

1. The starting point is distributions over the World at the State level in 2000.
2. Times series are firstly established at State level for the target period.
3. The regional distributions are established in the official units of each State at each time period.
4. The development of harmonised time series can be realised in different ways which are not pre-defined.
5. The problem of quality is not to refuse approximations but to control it by confidence levels.

1.1.5 The ESPON GIS and cartographic tools

The existing map making facilities will be adjusted, updated and supplemented according the special need by project 3.2 in case. Continuity will be guaranteed in respect of the cartographic support of the project and the network.

Questions to be solved in the project are related to the regional coverage and the way of the representation of global aspects. Beyond map making and GIS facilities the project faces the need to create its own scenario orientated (carto-)graphic language. Depending from the scenarios envisaged (spatial and thematic approach) the forms representation reaches from a cartography of spatial tendencies to a cartography without space (or territory).

1.1.6 Driving forces

The understanding of driving forces behind trends and developments is in particular of importance, as for most spatial trends it is not possible to establish time series at European level which allow estimations on future developments.

Two types of driving forces can be distinguished, trends and zeitgeist. Whereas trends discuss the existing developments, the beyond-zeitgeist part tends to approach the un-thinkable. Trends of interest for ESPON

3.2 are broad social, environmental, economic or spatial trends, originated by forces outside the control of the entity whose future is being determined. This involves forces originating from society, economy, technological change and the environment.

There are also a number of overarching aspects that are common to a wider set of systems or addressing the relation between systems, such as power relations, inertia and wild cards. After having identified a number of issues conditioning future spatial development, their spatial effects need to be discussed. Last but not least, the various driving forces need to be discussed in an interrelated manner focusing on their integration and policy relevance.

1.1.7 Impact of public policies

As proactive scenarios are necessarily based on policies, it is important to be able to anticipate their potential territorial impacts and also to investigate if these impacts are homogeneous or not on the European territory. We take the ways in which the policies are implemented and the interaction between EU, national and sometimes regional authorities (their governance) into account. This is important because implementation varies according to the legal and planning conditions in different member states. It is also crucial to analyze not only the implementation of EU policies and their territorial impacts but also the factors changing these policies, their implementation, and their territorial impacts.
We concentrate on the EU policies that generate the most important spatial impacts in the EU territory: Transport and Trans European Networks Policy, Common Agricultural Policy and Rural Development Policy, Regional Policy, Environmental Policy, Research and Development Policy, and Pre-accession and related policy-programmes.

1.1.8 Know trans-European Networks Model (KTEN)

In the context of the spatial planning issues covered by the ESPON program, a transport model should allow the prediction of future flows in order to identify potential bottlenecks. Such bottlenecks in important transport corridors can have very high impacts in terms of economic development, accessibility but also in terms of pollution. However, a model which only covers passenger transport misses the majority of flows, i.e. freight transports. We, therefore, propose a methodology for including freight into the existing KTEN framework.

1.1.9 Macroeconomic, Sectoral, Social and Territorial Model (MASST)

The Macroeconomic, Sectoral, Social and Territorial (MASST) model allows to interpret present territorial trends, by emphasising the role played by critical elements (like infrastructure, exchange rates, rates of interests, unemployment, human capital, social capital etc..) on regional growth. On the basis of the sets of relationships envisaged between these elements and local growth, simulation and forecasts on future territorial trends will be drawn, on the basis of some conditional hypotheses on macroeconomic trends.

The model is a quasi production function, which allows measuring the role of all elements influencing productivity and growth on regional performance. This methodology can be used either for national, regional or subregional analyses.

Scenarios will be built on some conditional (quali-quantitative) hypotheses on the trends that the macroeconomic and institutional elements mentioned above will follow. They will generate different territorial settings of the new Europe; each future territorial setting will define winners and losers, and will identify new levels of regional disparities.

1.1.10 European Territorial Cohesion Index (ETCI)

Envisaged as a measure of one of the main spatial policy goals, the proposed European Territorial Cohesion Index (ETCI) will be based on existing methodologies such as the Human Development Index, Sustainable Development Indices and others. As the final decision concerning the possible construction of a European

Territorial Cohesion Index (ETCI) should be, must be and will be a political decision, what can be achieved in ESPON 3.2. is:

- A summary of existing literature on synthetic indices
- The transposition to the ETCI purpose of methods previously developed.
- The comparison of various possible solutions applied on the same datasets.
- The research of new statistical measure adapted to political requests.
- Determining the meaning of choosing one particular index by policymakers.

To evaluate the advantage and inconvenient of the various concepts of methods which have been proposed for the elaboration of composite indices, we suggest to use one or two reference databases which will be the basis for systematic comparison of methodologies. Those reference databases will be made available for all ESPON users and the experiments will also be stored with complete results and programmes used.

1.1.11 Assessment of existing scenarios

The aim of this assessment is to describe the basic types of scenarios prepared in the field of long term and territorial planning and to select several samples for their characterisation. The section analyses different methodological choices made in existing scenarios, such as the perspectives in terms of action and time frame, scale, scope and quantification, the number of scenario alternatives, etc.

The assessment also includes a series of concrete examples of scenarios including their future visions and options. It goes into greater depth in the analysis of four examples of Interreg II C vision projects, examining issues such as objectives, contents, presentation and procedure. All visions have an environmental, economic and social dimension, and seek an integrated strategy for the sustainable development of the region. The approach is very much in the form of spatial planning - coordinating the spatial impacts of sectoral policies rather than physical or land use planning. The strategies all talk of the need to reconcile the competing demands of economic competitiveness, environmental sustainability, and social cohesion. The common responses indicate the pervasive character of the spatial development impacts of globalisation, and the widespread belief that, despite very different governmental and physical conditions, the negative consequences can be addressed effectively through improved spatial and regional planning.

1.1.12 A scenario approach

Scenarios may provide some points of reference for the communication among the policymakers and stakeholders involved in policies at the EU, the national, and the regional levels. In this respect it is important that the scenarios embody different but comparable images of the future. The ways in which scenarios can facilitate policy development include providing insights into the most important trends and driving forces determining the territorial development of the EU 27 plus the neighbouring countries and insights into the structural difficulties and potentialities these trends and driving forces may generate on the European, national, and regional level. Finally, the scenarios may provide the policymakers and stakeholders involved in spatial planning at the EU and other levels some ammunition to gain support for the policies they prefer.

Re-active, prospective or exploratory approaches are outward bound. They begin with the present as the starting point, and move forward to the future, either on the basis of extrapolating past trends or causal dynamics. Pro-active or normative approaches are, in contrast, inward bound. They start with a preliminary view of a possible (often a desirable) future or set of futures that are of particular interest.

Types of methods can be divided into qualitative vs. quantitative and expert-based vs. assumption-based approaches.

Some of the most often utilised techniques for scenario building can be categorised as:

1. Qualitative methods based on eliciting expert knowledge (scenario analysis workshops, Delphi method, brainstorming, SWOT)

2. Methods based on eliciting expert knowledge to develop long-term strategies (expert panels, mind mapping)
3. Qualitative methods using statistics (trend extrapolation, simulation modelling, cross impact analysis, system dynamics)
4. Problem solving scenario techniques (key technologies, relevance trees, morphological analysis)

The TPG proposes a balance between a qualitative definition of scenarios and their scientific validation by the use of quantitative models based on precise data, whenever possible. The scenarios generated by this approach combine a wide scope and a high contrast on the one hand with a high level of realism and explanation power on the other. Combining both approaches is not an easy task because this implies the integration of two different paradigms and intensive cooperation between researchers and designers who talk, think and work in very different ways. Therefore much attention must be paid to the application of a cyclical process in which every cycle makes a movement from the present (basic analysis) via the long-term (prospective and proactive scenarios) to the short-term (policy recommendations) and from the concrete (basic analysis) via the abstract (prospective and proactive scenarios) to the concrete again (policy recommendations).

1.1.13 Communication and consultation strategy

ESPON 3.2 requires a number of specific objectives to be met in relation to communication, consultation and validation throughout the project. These include the following requirements:

- To prepare the scenarios in a cyclical and dynamic process allowing the Monitoring Committee to take active part in the scenario team, where the scenarios are gradually developed and tested before the final results;

- To prepare and support a communication process exploring the scenarios at political level, that can improve the understanding of spatial development trends and issues of territorial cohesion within an enlarged EU. A communication strategy could include different elements from informal consultations to futuristic stories supported by cartographic illustrations.

Adopting a cyclical approach to scenario building strengthens project communication and validation procedures given that it enables the Monitoring Committee, ESPON Contact Point network, other stakeholders and the TPG to build a common vision on the process and agreement of the results. Consultation and validation activity will allow for discussion of issues such as:

- the acceptability of different scenarios amongst scientific and policy experts
- the barriers and obstacles to specific policy measures and outcomes
- the robustness of different policy options under different possible futures

Scientific and policy experts, such as members of the Monitoring Committee, the ECP and the INTERREG networks, will be invited to participate in scenario workshops, brainstorm sessions, system dynamics and other techniques for expert consultation. Moreover, meetings will be organised between the Monitoring Committee and the TPG. Furthermore, a series of round table meetings and individual expert interviews will be organised in order to validate the results of these techniques and the draft versions of the reports the TPG will produce.

Similarly, the communication and validation process is also part of the dissemination strategy for the project as a whole. There are a number of aspects of ESPON 3.2 that are required to be communicated and validated. These include:

- the overall process of the cyclical approach to scenario construction
- the scenarios, trajectories and policy orientations
- the conclusions and policy recommendations.

The process of widening the scenario building exercise to a broader circle of participants takes considerable effort. One obstacle is convincing stakeholders to spend time on discussing what may be seen as long-term issues and questions. The communication and validation process should not therefore be conceived as a one-way activity in which the project as a whole receives only external input for developing and improving scenarios. The process must also be considered as a dissemination activity where results and outputs are fed back into the scenario construction process to produce further reflections and outputs.

1.1.14 Knowledge and Communication (K+C) Tool

The web-based Knowledge and Communication Tool (K+C) aims to become a scenarios knowledge-base for policy support on the Internet, identifying and harmonising state-of-the-art references concerning spatial scenarios, trends and sectoral policies in Europe and other parts of the world. So far, the provisional web portal (http://www.mcrit.com/espon_scenarios) contains a preliminary selection of existing trends, national and European scenarios and information on relevant software and modelling resources. Ultimately, the ESPON virtual knowledge-base will no doubt reinforce the scientific integrity and consistency of the 3.2 co-ordinating and territorial cross-thematic project, and the ESPON initiative as a whole.

First results, syntheses of strategic policy-impact studies and other documents from ongoing ESPON 3.2 works will be introduced gradually. Moreover, user-friendly tools for data and indicator retrieval and graphic and desktop mapping visualisation will be developed. This interactive graphing and mapping tool may serve as a basis for the representation of scenarios. The material included in the scenarios K+C portal so far has been classified into four different sections:

1. Spatial Visions
2. Sectorial Visions
3. Trends
4. Modelling Resources

1.1.15 Scientific coordination of ESPON

The task of ensuring scientific coherence and networking has to be further developed and deepened. An effort is needed to structure all the results in order to combine the cross-thematic research results, thus delivering practical and comprehensible, integrated results for policy making. This should be done by combining the results of the individual projects into common analyses and reports. The task of scientific coordination will also include an active role of guiding ongoing projects and the additional 8-10 new projects envisaged.
In concrete terms the task of scientific coordination should contain the following elements:

- integration of the available data and results into combined, comprehensive territorial indicators (without falling into the trap of ‘one indicator that says it all’)
- inclusion of the other TPGs into the scenario validation process (ESPON seminars)
- an extensive use of communication / networking (internet) in order to create greater interdisciplinary exchange between TPGs
- guidance of new projects / support in definition of terms of reference
- the inclusion of the ECP network in the research process and the use of its already existing scientific evaluations into the effort of distilling the existing results into a common framework of research
- guidance and cooperation with TPGs on further development and deepening of a common scientific platform for the ESPON programme
- close cooperation with the ESPON CU / the ESPON management level

1.2 Questions for the Lillehammer seminar

The following list of questions was meant as a basis for discussions in Lillehammer, notably during the workshop session dedicated to project 3.2. The present final version of this report integrates the results of these discussions. However, some of the questions cannot be answered at this stage of the process. We have decided to leave the questions in the report as a guidance for the reader, and as stimulation for further debate.

1.2.1 Data and visualisation

- How to operationalise the policy goals? Which goals are goals as such and which are means to other ends? Can they be questioned?
- Which indicators should be used as key indicators? Which indicators are the easiest to understand for policy makers?
- How far should the TPG go in terms of new data collection / organisation?
- How to assure the maintenance of the ESPON database after the end of some of the projects? How to structure the ESPON database to assure its sustainability after 2006?
- Is there political demand for a European Territorial Cohesion Index (ETCI)?
- How to visualise scenarios?

1.2.2 Spatial functional typology

- Which regional types seem the most appropriate for generalisation of future visions and of policy recommendations? Are the ones proposed in the present report useful?
- Which scale(s) should be used for scenarios?
- How can the different types of regions be characterised in terms of strengths and weaknesses (SWOT brainstorming)?
- Should scenarios be region-based or sector/issue-based?
- How should we deal with neighboring regions outside the ESPON territory?

1.2.3 Driving forces

- Which driving forces are the most important?
- How can driving forces be evaluated qualitatively?
- What 'wild cards' can be imagined?
- To what detail should national and local policy implementation issues be studied by the TPG?

1.2.4 Scenario

- Which types of scenarios are desired?

- Which methods / techniques should the TPG favour?
- Which are the basic hypotheses scenarios should be built upon?
- What are some general visions of (un)desirable futures that should be included?

1.2.5 Communication and consultation

- What types of experts and who do we consult with?
- How should/can ESPON seminars be used for consultation and validation?
- What are the possibilities of the MC in terms of regular communication with the TPG? What forms of communication are the most adapted?
- Are other TPGs willing to engage in discussions linked to the scenario building process? What about once their project is over?
- How can the ECP network participate more proactively in the research process? Can the ECPs mobilise national research networks?

1.3 Outlook and time table of activities

The present report will be finalised for the end of May, thus allowing the inclusion of the results of the discussions in Lillehammer. At the end of June, we will hold a general TPG meeting in order to organise the next phase of the project with all partners, including the experts.
The following table indicates the tasks to be achieved between now and the second interim report in March 2005:

Task (responsible partner)	*Activities until March 2005*
Data assessment (IGEAT)	• Evaluation of data needs for first round of scenarios • Evaluation of available ESPON and other data in light of the identified needs • Integration of the regional assessment from project 3.1 • Integration of the SWOT analysis to be realised in project 2.4.2
ESPON Database (BBR)	• October 2004: Taking over responsibility of the database • Up-date of general regional data and indicators (former 3.1 generated indicators). • Finalizing the generating of Land use indicators of Corine 2000 data and changes to CLS1990 started in 3.1 and • Integration of TPG data and indicators according to the deliveries in Interim Reports • Re-programming the data base according to time series, regional coverage and new data • General data demand survey

Task (responsible partner)	*Activities until March 2005*
New database structure for long term time series (UMS RIATE)	• May 2004 : Agreement between ESPON and EUROSCOPE on the project of a long term database (rights, intellectual property,...) • May 2004 - December 2004 : Achievement of technical specifications (data modelling). This step will include a test phase of validation on a set of elementary data (population, area size). • December 2004 (until December 2005): Data collection & harmonisation for basic indicators 1960-2000. The list of basic indicators will include demographic data (age, sex, birth, death) and economic data (GDP or equivalent measure, activity). Improvement and generalisation of the data model.
Driving forces (NORDREGIO)	• Identification of major areas of relevance • Analysis of major driving forces • Discussion on spatial impacts
Policy impacts (NISR)	• May 2004: Processing comments made by participants of ESPON seminar • May 2004: Reflection on conceptual framework • August 2004: Further analysis of relevant ESPON projects June? • September - October 2004: Analysis of other relevant literature • November - December 2004: Interviews with scientific and policy experts • January 2005: Synthesis of gathered knowledge and data • February 2005: Writing of first draft report
KTEN model (MCRIT)	• Freight generation and attraction • Calibration • Freight modal split • Assignment
MASST model (DIG)	• April - September 2004: In this period the database will be built, all indicators defined, period of analysis identified on the basis of the available data. • November - December 2004: In this period the estimate of the MASST model will be run, overcoming all technical and econometric problems that can arise. At the end of 2004 the first consistent estimates will be achieved. • January - March 2005: Final estimates will be obtained on the basis of which some conditional hypotheses will be drawn.
ETCI (UMS RIATE)	• May 2004 (Lillehammer - FIR): Presentation of assumptions and methods with illustrations. Agreement on the future development of the project. • May 2004 - March 2005: Review of literature on composite indexes of development- Experiments on test database (2nd Cohesion Report). • March 2005 (SIR): Presentation of proposals for ETCI - Agreement of the Monitoring Committee.

Task (responsible partner)	*Activities until March 2005*
Scenario building (AETS)	• Further literature review and synthesis of scenario assessment • Draft first generation scenarios • Preparation of Delphi round in September • Definition of further data needs for scenarios
Communication and consultation (CUDEM)	• May 2004 (Lillehammer): Discussion to clarify project objectives and initial scenario ideas • June 2004 (TPG meeting): Discussion to establish a panel of experts and clarification of upcoming work • September 2004: Delphi round with experts via website • October 2004: Panel meeting using results of Delphi round for developing ideas on building blocks • November 2004 (TPG meeting): system dynamics discussion to establish first generation of scenarios • March 2005: Second interim report with results of previous activities and integration with quantitative analyses
Knowledge & communication tool (MCRIT)	• Continuous updating of web portal according to results of project tasks • Integration of existing forecasting models • First draft version of mapping components for model results
Scientific coordination (IGEAT)	• Participation in coordination meetings with CU and BBR, notably in preparation of the Nijmegen seminar • Presentation of K&C tool • Contacts with ECP network on possible research activities and on scientific evaluations of projects

2 Introduction

Project 3.2 only started in February with its kick-off meeting being held on February 20th. The time available for the present report was thus limited and it should be seen as a first review of the state of data and of methodologies to be used in the scenario building process. First substantial results should not be expected before March 2005.

After a brief reminder of the objectives and the contents of project 3.2, this report offers five main parts. The first deals with the assessment of the current data situation and propositions on future data structuring. The second reviews the current knowledge concerning the main driving forces and the impacts of public policy. The next part explains the proposed methodology for three elements of further data analysis: the integration of freight into the KTEN transport model, and the two integrative analytical tools, the macroeconomic MASST model and the European Territorial Cohesion Index (ETCI). The fourth part concerns one of the main issues of the project, scenario building. After an analysis of existing scenarios and visions, we propose a scenario (building) approach that should allow both efficiency and creativity. Finally, we introduce our ideas with regards to a permanent consultation process on our scenarios and other analyses and to the scientific coordination of the ESPON programme which will be taken over from project 3.1 at the end of the year.

3 Project 3.2 - its objectives and its TPG

3.1 Objectives

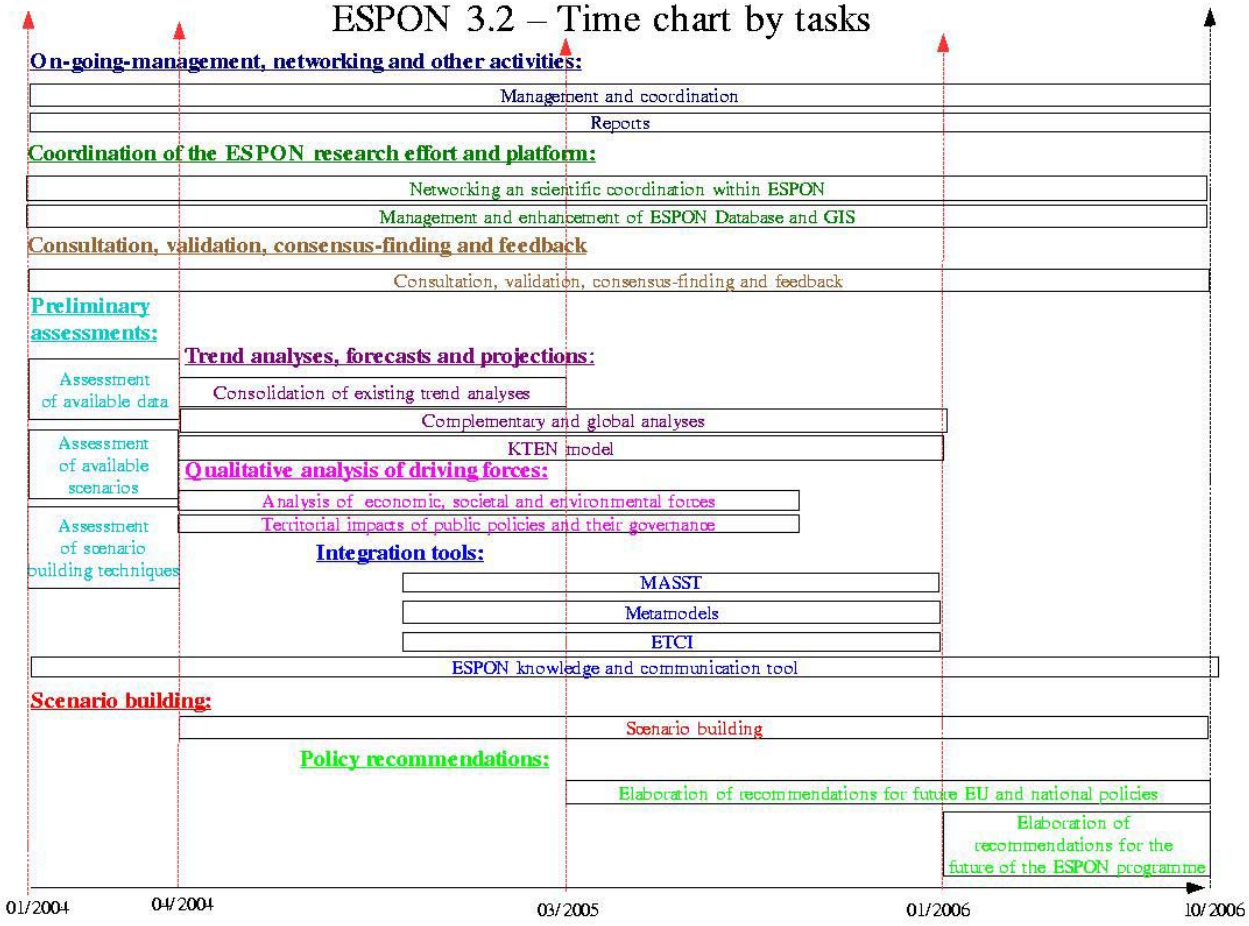
ESPON 3.2 has two main objectives:

1. Synthesize all data and information collected in the ESPON projects and other transnational research efforts and build spatialized scenarios on possible and (un)desirable futures in order to deduce policy recommendations from them.

2. Coordinate the ESPON research effort in order to develop sustainable tools allowing the creation of a research network / programme on European territorial planning.

These two objectives allow for a fair amount of synergies between them and so cannot be clearly separated from another. However, for practical reasons, they are treated as two distinct strands. Both will, at the end, feed into policy recommendations for spatial policies as well as for research policies. Eventually, depending on decisions at political level, a reviewed and proactive ESDP policy document embracing the enlarged territory of the European Union as well as further development within Cohesion policy in relation to objectives for Community support and intervention should be able to find support in using operational results from project 3.2.

The project consists of four main parts. The first and main part concerns the actual scientific effort leading from a synthesis of the currently available data and information to different types of scenarios, by going through quantitative and qualitative trend analyses and an effort to integrate the information gathered into a global view of European spatial dynamics. The second part contains the consultation and communication work that is absolutely necessary if this project is to be of any practical use to policy makers and if its results are supposed to have a wider impact than just within the ESPON programme. Another very important task for project 3.2 is the coordination of the entire ESPON research effort and the continuation and enhancement of the ESPON platform, including the ESPON Database and GIS. Last, but definitely not least, is the end result of the project, i.e. the elaboration of actual policy recommendations, both for future European spatial policy and for future European spatial research. In order to give an idea of the relative weight of each of the parts of the project, the following time chart provides a schematic time schedule of the entire project:


ESPON 3.2 – Time chart by tasks
On-going-management, networking and other activities:
Management and coordination
Reports
Coordination of the ESPON research effort and platform:
Networking an scientific coordination within ESPON
Management and enhancement of ESPON Database and GIS
Consultation, validation, consensus-finding and feedback
Consultation, validation, consensus-finding and feedback
Preliminary assessments:
Assessment of available data
Assessment of available scenarios
Assessment of scenario building techniques
Trend analyses, forecasts and projections:
Consolidation of existing trend analyses
Complementary and global analyses
KTEN model
Qualitative analysis of driving forces:
Analysis of economic, societal and environmental forces
Territorial impacts of public policies and their governance
Integration tools:
MASST
Metamodels
ETCI
ESPON knowledge and communication tool
Scenario building:
Scenario building
Policy recommendations:
Elaboration of recommendations for future EU and national policies
Elaboration of recommendations for the future of the ESPON programme
01/2004
04/2004
03/2005
01/2006
10/2006

3.2 The TPG

Project 3.2, through its overview and synthesis character, demands the most elaborate cooperation between different research fields and locations. The present group reflects this, both geographically and thematically.

The team contains four ESPON contact points (IGEAT, UMS RIATE, BBR, DIG) and covers 14 countries, of which two acceding countries (Hungary, Poland), one candidate country (Roumania), Switzerland, and one Southern Mediterranean country (Tunisia). Members of the team have experiences in diverse fields necessary for the solid completion of the tasks of project 3.2 and, thus, complement each other very well.

In order to ensure the necessary efficiency in spite of such a large group, it is organised in two layers: a central project group and a group of experts whose role is to validate and complement the work of the central group. IGEAT, Brussels, has the project leadership, supported in this task by AETS, Strasbourg.

Project Leader: IGEAT - Belgium

Project Co-leader: AETS (Jacques Robert) - France

Core team:

BBR – Germany	MCRIT – Spain
CRS – Hungary	NISR - Netherlands
CUDEM – Great-Britain	NORDREGIO – Sweden
DIG – Italy	UMS RIATE - France

Experts:

DPS – Tunisia	IWH - Germany
ETH Lausanne & Zürich – Switzerland	NTUA - Greece
EUROREG – Poland	TIGRIS - Romania

4 Assessment of data situation

Introduction

NB: The terms of reference state the following expected result for this interim report: 'Consensus on indicators and necessary data after a precise analysis of the availability and comparability of data within the ESPON Data Base and at Community level'. It is important to note, however, that the indicators to be used can only be defined precisely once the scenario process has advanced further than currently, as it will be the types and contents of the actual scenarios which determine the data needs. The following is an attempt at defining the general realm in which we will work, with a few examples of concrete indicators. It will certainly be subject to change throughout the process.

In order to evaluate possible futures of the European spatial structure, empirical evidence is needed. Without such evidence the scenarios to be constructed in the course of this project will be pure speculation without a link to the 'real' world, other than the individual knowledge of those building the scenarios. At the same time, analysing data will also provide insights into the limits of such empirical grounds, thus defining the space in which intelligent speculation is actually desirable.

The ESPON programme has created a vast amount of data, collected by the different projects, or centrally provided by Eurostat. This data, and the information and analyses derived from it, is beginning to create a very profound and differentiated view of European territories. However, for the data to be usable (and reusable) in a synthetic and prospective way, it will be necessary to choose a series of key indicators amongst all the proposed indicators, and to extend these indicators in time by creating longer time series than currently available.

In this section we begin by evaluating the needs of data, in terms of the specific objectives of 3.2, notably scenario building, by asking the question of what we actually want to measure. Linked to that is the question of how to measure these issues.

We will then approach the question of what data actually exists. Also included in this reflection is the selection of certain key indicators on which we propose to focus in terms of quantitative analysis for the scenarios.

The data used needs to be structured in a way to make it easily understandable and usable in the context of (political) future scenarios for the development of European space. We propose to structure the data on two levels, spatially and organisationally.

On the spatial level, we propose to regionalise the ESPON territory according to a functional regionalisation based on economic structures. This will allow the development of scenarios according to types of regions.

In terms of an 'organisational' structure of the data, two parallel paths are proposed: the maintenance of the existing ESPON database, and the creation of a specific long-term structure for time series, including a reflection on issues of data continuity in time.
Finally, one important aspect of data analysis and scenario building is the communication and the graphical display of results. In the last section of this chapter we will review the current state of the ESPON GIS and related tools and reflect on the needs for the future.

4.1 What we want to measure and how we can measure it

In order to decide which indicators are key indicators, necessary for the exploration and evaluation of European spatial development and thus for the scenario building process, it is helpful to take a step back and remind ourselves what we actually want to measure. One can divide the subjects of research into two

categories, the actual policy goals as defined by the ESPON programme in reference to the ESDP, and other measures of spatial development indispensable for an operationalization of these policy goals.

4.1.1 Operationalization of policy goals

(a) territorial cohesion

One of the main spatial (or spatialisable) goals agreed upon by the member states is the idea of territorial cohesion. A simple definition of this concept would be the limitation of disparities between regions, be it in terms of economic, social or income disparities. This will be dealt with through two measurements in our project, the European Territorial Cohesion Index (see 6.3) and the MASST model (see 6.2). The latter will address cohesion from an economic point of view, while the former will use larger definitions of the concept.

(b) competitiveness

Competitiveness is mostly to be understood as economic competitiveness, i.e. the capacity of a region to produce wealth and employment. Here the MASST model will give indications of possible future evolutions, measured through growth in GDP. Other possible measures of competitiveness are unemployment rate and income, but also, outside the economic sphere, the attraction of populations (i.e. in-migrations).

(c) sustainable development

Sustainable development can be understood in a limited, ecological sense, and in a more general sense, including issues of cultural heritage, social harmony, standards of living, etc. This is probably one of the most difficult elements to measure, since it depends on political definitions. The ETCI will include elements of this, if options are taken to go in the direction of something like a sustainable development index (SDI).

(d) access to services

Access to services combines two elements: accessibility / mobility and service infrastructure endowment. Measures for the first exist and have been further developed within ESPON, but the second is more difficult to measure, especially at the spatial resolution of NUTS 2 / NUTS 3. We would have to develop proxies if we decide to measure this aspect of spatial development, but in view of the current data situation, this is probably outside the scope of project 3.2.

(e) polycentricity

It is not clear whether polycentricity is a goal as such, meaning that it is considered as being ‘good’ on its own, or whether it is actually a first step of operationalisation of territorial cohesion and access to services. Some ESPON projects have already attempted measurements of this objective, and we will take their typologies as a basis for definition.

4.1.2 Other basic measures of spatial development

The operationalisation of the above objectives will be explored in the ways suggested above. However, whatever the index or indicators chosen for a given objective, it will have to be based on basic data. The ESPON database gives a large choice of indicators. These indicators will have to be maintained and developed to support future research activities concerning European spatial planning. However, in the course of 3.2 we will have to limit the number of indicators in order to ensure higher efficiency and to allow an extension in time. The following three domains of data appear as the most important for increasing spatial evolution:

(a) economic structures

The economy is certainly not the only factor determining spatial structures and trends, but it is undeniably one of the main elements. In order to understand and predict developments, a good knowledge of the economic structures of European regions is of prime importance. They will serve as a basis to the MASST model, but also to the regionalisation of Europe (see below). Up to now, there has been very little work in this field in the context of ESPON in spite of its importance. The upcoming project 3.3 should change this.

(b) population development

The study of demographic evolutions in the European regions reveals both causes and consequences of spatial developments. For example, a population decline might be the consequence of a difficult economic situation, but might also cause a lack of labour force. It is thus very important to study the demography of European regions, task on which ESPON 1.1.4 has already advanced considerably.

(c) flows (persons and goods)

Spatial trends are inherently tributary to flows, both of persons and of goods. Such flows, be it short-term or long-term are driving forces both for changes in spatial configurations and for equalisation across space. At the same time, they are quite hard to measure at a sufficiently large scale in order to determine regional effects on meso and micro levels. The most common way is to look at transport flows as a proxy, although these cannot give account of the types of movements. Projects 1.2.1 and 2.1.1 have developed models for such flows. In addition, we will further develop the KTEN model to also include freight transport (see section 6.1).

(d) land use (Corine 2)

4.2 A regionalisation of Europe

It is impossible, in the context of the ESPON programme in general and within project 3.2 in particular to evaluate the evolutions of all European regions at NUTS3 or NUTS2 level individually. Generalisations have to be made in the form of typologies in order to develop visions and policy recommendations for certain types of regions.

The choice of a certain typology over another as the basis for evaluation is to a certain point arbitrary. There is no 'best' regionalisation of Europe, only those that are the most functional for the chosen task. In the context of future visions for the covered territory, it is of prime importance to include into this regionalisation those factors that seem to influence these regions profoundly and sustainably, i.e. in a long term perspective. However, these factors also need to be measurable (and easily so) in order to classify regions into different types, without falling into a purely quantitative vision.

We have decided to base our regionalisation on an informed analysis of the economic structure (measured through GDP by economic sector) of European regions such as explained in Vandermotten and Marissal (2000).[1] This analysis takes into account sectoral structures that often reflect many socio-economic realities of the respective regions. The developed types thus seem a good container for the exploration of spatial developments.

We propose to regionalise Europe according to the types of regions listed in the following table. However, it is very important to understand that these regions are not meant as an exhaustive coverage of European space, but more as functional types which have specific characteristics and, thus, specific futures and needs. An individual region might find itself at the intersection of two or more types and concrete policy for a

[1] Vandermotten C. and Marissal P. (2000), 'Une nouvelle typologie économique des régions européennes', *L'Espace géographique*, n. 4, pp.289-300.

specific location needs to take into account the exact situation of this location. In addition, the attribution of a specific region to one of these types may change in function of the thematic area studied. Thus, these regions are to be seen as qualitatively descriptive. The table also gives some first elements of evaluation of the situation in the different regions.

Table 1. Functional regionalisation of Europe.

Region	**Subregion**	**Characteristics**
Central and intermediate cities	Global cities	Metropoles within global high-order networks; high GDP; business and financial services; R&D; international commandment; international transport hubs; often high income disparities (internal or with their peripheries); some polycentric metropolises
	European Cities	Cities with European importance; capitals; high GDP; national commandment; transport hubs
	Intermediate cities	more industrialised than metropoles; less commandment; regional central places
Central Industrial	Harbours	high concentration of transport industries; maritime iron and steel (or metal) and chemistry; functionally integrated integrated with central areas
	Fordist	fordist industries of the 60s and 70s; light industries
	Old industry (coal and steel)	heavy industry in decay; high unemployment; unflexible socio-economic structures; often little local entrepreneurship
	SME networks	polycentric; clusters; endogenous development
Secondary center	Endogenous	endogenous high-tech industries; niche industries; based on local traditions
	Exogenous national (state)	state-driven decentralisation; direct public investment; development poles; R&D; clustering of high-tech industries; attractive environment
	Exogenous international	foreign investment; low wages; important tax incentives; state (European) investments in infrastructure
Rural	Central	capital-intensive agriculture; agro-food industries; rurbanisation; conflicts between land uses
	Intermediate	less capital-intensive agriculture; more rural; some dangers of depopulation; some local and endogenous economic development
Touristic	Coastal	high dependency on tourism industry; environmental issues; control of quality of landscape; issues of accessibility;
	Alpine	issues of accessibility; environmental issues; low-capital agriculture
Peripheral	Metropolitan	peripheral metropolises; low GDP; high rate of poverty; central place functions; local motors of economic development; problems of (international and internal) accessibility; sometimes highly centralised (no polycentricity); outdated infrastructure
	Rural	remote regions; very low population densities; desertification; problems of accessibility and access to services
	Coastal areas / harbors	declining fishing and related agro-food industries; maritime iron and steel (or metal) and chemistry; isolated from central areas
	SME	clusters; from rural or old local industrial traditions; problems of access to (international) markets
Accession	Metropolitan	highly centralised, economically and administratively; growing populations; need of integration into international urban networks; hubs for access to accession countries
	Old industry	very low GDP; old heavy industries; environmental problems; very high unemployment; conversion difficult
	Western border	maquiladoras; wage advantages; but sometimes high costs of living; dependency on foreign capital
	Rural	high rate of employment in agriculture; high unemployment; adaptation to CAP; capitalisation and deruralisation; issues of accessibility and access to services

Reactions in Lillehammer

At the Lillehammer seminar, the above proposition was submitted to a workshop. During this workshop several critiques and ideas were voiced. The main critiques concerned the lack of apparent links to the existing ESPON typologies and the uniquely economic base of the typology. Some found it too city-centric and others complained about the use of vocabulary which hints at structures of the past. It was also argued that the regions in the new member states should be integrated with the others and not treated separately.

A part from the direct answers to the above criticisms, the members of the workshop mainly proposed to wait as, according to some, a typology should be an outcome, not the starting point, but also, and maybe more importantly, a typology used in the scenario building process should be adapted to the needs of this process in terms of addressees of the scenarios, their topic, the sectors covered, etc. It would thus seem advisable to return to the question of a functional regional typology once the first scenario drafts have been developed. At that point, choices between existing ESPON typologies and other possible typologies will have to be made according to the needs of each particular scenario approach.

An interesting proposition concerned the inclusion of processes instead of only static indicators. Such dynamic indicators could differentiate between regions that seem to be close but have very different evolutions. The question of how to deal with border situations and disparities was also raised.

The TPG thus proposes to postpone a decision concerning typologies until the spatio-sectoral orientation and the scale of scenarios have been clarified. It does note, however, that none of the existing ESPON typologies allow an overall functional division of the European territory and that a regional approach to scenarios will make such a division indispensable. The regional classification, to be produced by project 3.1, might cater to this need. We will, therefore, wait until this classification is finalised and until first scenarios hypotheses and orientation have been discussed before taking any further decisions.

4.3 The current ESPON data situation

Project 3.2 does not have the task nor the resources to create many new data. It will, therefore, use the existing ESPON database as much as possible. However this database is clearly insufficient in view of the creation of long-term scenarios, but also in terms of some of the basic indicators enumerated above, such as the economic structures.

Please see annex III for a complete list of the currently existing indicators in the ESPON database. These indicators are the result of the work of the different ESPON projects and represent the current state of knowledge of the ESPON territory.

As can be seen in this list, the temporal scope is quite limited and these data can thus not be used as a basis for quantitative projections into the future. However, some of these indicators will be useful in view of an evaluation of the current situation as regards the different goals listed above.

Amongst this general indicator list (the ESPON ‘core’ indicators), several indicators can be highlighted as ‘key’ indicators in relation to the different topics identified above. The following table lists the subjects of study / measurement and corresponding indicators from the ESPON database that we propose to chose as key indicators. In the third column we list other indicators, not present in the ESPON database, but which seem important to us in view of the defined objectives.

Table 2. Indicators from the ESPON database and other suggested key indicators.

Subject of measurement	Available indicators from the ESPON Database	key indicators from the ESPON database	other key indicators (? = does it exist?)
territorial cohesion	unemployment rate, gdp per capita, impacts of transport scenarios on regional welfare, typology of lagging regions	unemployment rate, gdp per capita	ETCI, MASST
competitiveness	labour force, population by tertiary education, medium-high and high-tech manufacturing (% of manufacturing employment), gdp (total and per capita), high-tech patents, R&D expenditure & employment	high-tech employment and patents, R&D expenditure and employment	wages, fixed capital, MASST
sustainable development	land use typology	land use typology	regional CO2 output (?), protected areas (?), Corine 2
access to services	typology settlement structure, typology multimodal accessibility potential, km per person in trip by purpose	typology multimodal accessibility potential combined with typology polycentricity	service endowment (?)
polycentricity	typology polycentricity, typology FUAs, effects of transport scenarios on polycentric development	typology polycentricity	
economic structures	employment by sector and sex	employment by sector and sex	fixed capital, value added by sector
population development	total population by sex and age, population change typology, dependency ratio, aged vs. young, labour force	population change typology, total population by sex and age	
flows (persons and goods)	traffic in commercial airports (passenger and freight), seaports (freight), total trips by purpose (NUTS2), population change by migration	population change by migration, freight traffic in commercial airports and seaports	KTEN freight model output, origin-destination migration matrix (?)

As becomes obvious very quickly, the choice of key indicators is limited, and for some of the topics almost null, as for example for sustainable development (in its environmental sense). Project 3.2 will, therefore, have to partially create its own data sets in order to fulfil its mission of scenario building. This is the case, for example, for the MASST model whose output is a key indicator, but which requires a whole series of indicators as input (see section 6.2 MASST model).

Other data sources

In view of the already mentioned insufficiencies of the ESPON database, other sources will have to be tapped for some of the indicators, especially in view of long-term series. Here are some of the sources:

• Eurostat

Some of the indicators present in the REGIO database are not listed within the ESPON database indicator list. However, we will probably have to use some of them (see above table 2). In addition to the REGIO database, other Eurostat data, such as the household panel and the Eurobarometer might prove useful for the integration of societal and social aspects to cover subjective regional attitudes of the population concerning the enlargement, European integration as well as other topics like living conditions.

• Euroscope

Euroscope is a long-term database developed by two of the project's TPG members. See sections (4.4 ff. - ‘ESPON Databases and ESPON Schizophrenia: which solution?’) for more information.

• AMECO Database

For long-range ex-post and short-term ex-ante evaluations of main socio-economic indicators, the AMECO database of the DG Economic and Financial Affairs could be used on the pan-European and global level. In combination with global databases of multi-national institutions like e.g. OECD and the United Nation, the AMECO database including data from main economic competitors and global economic regions will serve as a starting point to investigate the world situation necessary for a scenario development. The aim will be to reach a Europe in a not isolated system.

• UNDP

In the context of the elaboration of its Human Development Index, the UNDP has developed a quite extensive database with some interesting indicators that might prove useful to the elaboration of the ECTI. Especially for the accession countries, national reports also include regional data of fairly high quality.

• Other international sources (WB / IMF / OECD / UNCTAD / UNHCR / ILO / etc)

Other international sources will be useful, both for putting Europe into an international context, thus measuring global driving forces that influence the European territory, such as international migrations, developments of world markets, globalisation of economic activities, wage relationships, etc, and sometime for national-level indicators in Europe itself.

4.4 ESPON Databases and ESPON Schizophrenia: which solution?

At the very beginning of the ESPON Programme, many researchers involved in the TPGs noticed that the terms of reference were too ambitious and contradictory, introducing a mixture of short-term and long-term objectives. The French focal point described this confusion as a kind of 'ESPON Schizophrenia':

The ESPON 2003 objective (1 year programme) was to provide 'punching results' realised in a very pragmatic perspective, but with the clear awareness that those results would not offer the best guarantees in a long term perspective. The problem was to provide as soon as possible useful inputs for the 3rd cohesion report and the political debate on the reform of structural funds.

The ESPON 2006 objective (5 year programme) should be clearly different and would focus on the real establishment of a permanent research network on territorial planning at the European scale. This latter would have the mission to propose a revised version of the ESDP and to establish the basis of a permanent Observatory which would be able to produce in-depth reflection on territorial planning, based on good scientific infrastructure (databases, maps, concepts...). The control of quality should be very strongly established at all levels.

This contradiction between short-term and long-term perspectives appears particularly obvious in the field of databases. In the TPG ESPON 3.1, there were many discussions at the early beginning on the different methods which could be used for the technical structuring and quality control of the ESPON database. In September 2002, a proposal was made in favour of a very strong quality control and integration of the ESPON database (see Annex I). But this proposal was not adopted because it was admitted by all members of the TPG 3.1 (including the author of the proposal) that time and resources were not sufficient for the implementation of such strict and difficult rules for the management of data collections and data storage. The solution adopted by ESPON 3.1 for the structuration of the ESPON database was certainly the best possible compromise between the contradictory expectations of the ESPON Programme.

It is also important to notice that, whatever the means which might be allocated to databases in the future of the ESPON programme, some problems can not be solved in the framework of a policy-oriented programme but are directly related to the responsibility of other institutions like INSPIRE (former ESDI) which has precisely the responsibility of producing harmonised geographical information at European level. The

ESPON 3.1 has established connections with the INSPIRE network, and those connections will be maintained by ESPON 3.2. This means that ESPON will be informed of all recent progress in the harmonisation of European databases and, conversely, will propose some guidelines for further demands concerning database and map harmonisation (e.g. toward a unified definition of functional urban areas). Our very pragmatic proposal for ESPON 3.2 is two-fold:

1. Maintain and develop the ESPON DATABASE elaborated by ESPON 3.1 which has the great advantage to propose a wide set of indicators, some of them very original. It will probably be difficult to develop this database through a long period of time (because the change of territorial division has not been directly taken into account in the structure of the database) but it is certainly possible and interesting to keep this database available during the lifetime of the ESPON programme and to establish at least some mid-term time series (1995-2005). The continuity between ESPON 3.1 and ESPON 3.2 will be insured by the Bundesamt für Bauwesen und Raumforschung which will keep the responsibility of this work and will organise the dissemination of results (See sections 4.4.1 and 4.4.3).

2. Develop a long-term database for political scenarios in connexion with the research network EUROSCOPE. The database EUROSCOPE which has been elaborated by the French and Belgium teams involved in the TPG ESPON 3.2 provides a limited set of variables (demographic, economic) at the level NUTS2/NUTS3, covering eastern and western part of Europe since 1960. This database has been the basis of many scientific publications like the 'Atlas Economique de l'Europe' or 'Atlas de la Population Européenne' and was used for studies for the European Commission. It will be the basis of a specific experiment developed in the framework of ESPON 3.2 (Section 4.4.2).

4.4.1 State of ESPON database and future strategies and questions

ESPON database - New demands and continuity

Within the project 3.2 the management and improvement of the ESPON database must cover two aspects in the future work:

- Satisfy the scenario related special demands of the project 3.2

- Guarantee the continuity of an ESPON database in relation of a continuous spatial indicator based monitoring

Starting with the latter, the ESPON data base must guarantee a continuous provision of regional and spatial information during the ESPON process, especially thinking of the successive ends of the different projects and in terms of the implementation of the ESPON core indicator list, which includes indicators seen as fundamental for the analysis of spatial structures and trends in Europe. The implementation of the aspects of this list within the discussion and decisions processes in European spatial information and regional statistic activities is a fundamental outcome of the ESPON projects.

In the implementation of a continuous monitoring, the ESPON database as it is designed and intended in the co-ordinating and elaboration activities by project 3.1, will be a valuable input for the future maintenance and updating. After the end of project 3.1 the continuous maintenance and update will lie in the responsibility of project 3.2.

With the end of the different ESPON projects, the maintenance realized within 3.2 must concentrate on the general indicators provided on the base of the European Statistical System co-ordinated by Eurostat and on those of special project related interests, since it would be irrealistic to think that one project can continue to reproduce the results of all the others. As these data are in general based on the Eurostat Regio database, the updating will be done according to the agreements for new data deliveries with Eurostat. The use and integration of data of national statistical institutions and other source must be decided on a case by case

basis. Any meta-information needed has to be provided by the appropriate TPG and 3.1. This also includes a potential continuation after a possible end of the ESPON programme.

In general further clarification is necessary for the future procedures for the updating of relevant data of other ESPON projects included in the 'core indicator list'. In the phase of transition project 3.2 will contribute in this respect to the concept on future oriented possibilities and up-date procedures project 3.1 is asked to propose in its final report.

Related to this project an essential new orientation is obvious and of more importance with its special focus on the project related demands to the database for the elaboration of the scenarios envisaged including a balance of qualitative and quantitative elements.

The need to maintain and further develop the existing ESPON database in the context of a longer time range and broader spatial coverage in the context of spatial scenarios and the investigation of selected socio-economic trends is obvious. The next section deals with specific issues arising out of this need. However, the common framework of indicators agreed upon in the existing 'core indicator list' will also be further developed and enriched according to the needs related in this respect.

The time range has to be extended into the past to allow long time trend estimates for fundamental indicators. In the case of possible future orientation, trends should be covered with already existing data, e.g. the Eurostat population forecast.
In general, data used should be official to avoid discussions on the reliability, best based on EU sources agreed.

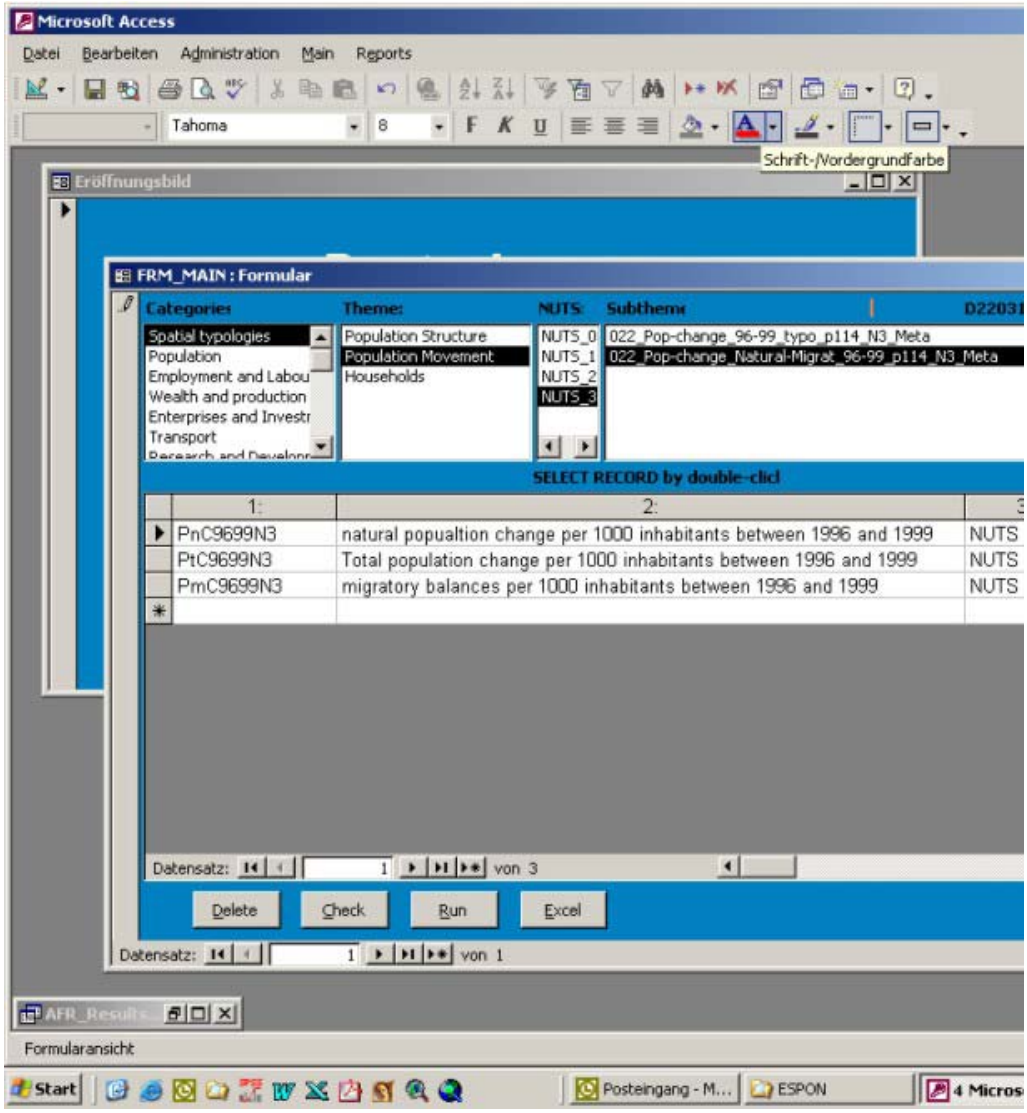
Being aware of the problems of data harmonisation and regional coverage and considering the macro-regional and more spatial scope of the envisaged scenarios, the use of NUTS 3 strictly demanded by ESPON should not prevent a potential territorial and socio-economic analysis. A broader use of the more functional, and in the EU sense, so-called standard regions for socio-economic question - NUTS 2 - could be an appropriate level for those cases where data do not cover NUTS 3. With the help of the regional references already included in the existing database, an analysis on the level of European macro regions like Interreg Areas will be possible.

The structure of the database could be oriented to the final proposal on the ESPON MS Access database of project 3.1 indicated in the last interim report. Currently the ESPON data basis is a thematic orientated database according to the final version of the ESPON Data Navigator. Besides the overall features of a general use of MS Access, the data base includes a user friendly front end solution for easy investigation and selection of data and indicators in thematic and spatial dimension by

- Theme (e.g. population, employment and labour market)
- Subtheme (e.g. population structure, structure of persons employed)
- Regional level (NUTS)

The selection of indicators is organised in a narrowing process via the steps indicated above leading to the appropriate meta data file. The selection and combination of indicators take place on the basis of the meta data, further handling is ensured within MS Access as well as the export to MS Excel.

Figure 1. Screenshot of betaversion of ESPON Database provided by project 3.1.



On the basis of the existing data base design, programming according to the special needs of this project will ensure the integration of the different project tools and work package related data outputs and the access to the derived indicators. The overall European perspective according to a long time range perspective of multi-scalar analysis could be integrated easily.

The modified data access via a new front end must guarantee the selection according to an additional time dimension and project related elaborated and improved thematic and spatial dimensions.

The project related adjustment of the data base will cover aspect of

- time (access via single year or time series)
- improved thematic range according to the
  - integration of MASST result
  - multiscalar generated indicators
  - ESDP policy aims measurement on the basis of already existing project 3.1 generated meta information
  - Global indicators
- further developed spatial coverage considering
  - NUTS 0 and country level, European global integration
  - European Macro Regions (Interreg)

- Regions with economic and geographic handicaps
- Spatial aggregates of ESPON projects typologies and classifications

Tasks until March 2005

• October 2004: Taking over responsiblity of the database
• Up-date of general regional data and indicators (former 3.1 generated indicators).
• Finalizing the generating of Land use indicators of Corine 2000 data and changes to CLS1990 started in 3.1
• Integration of TPG data and indicators according to the deliveries on Interim Reports
• Re-programming the data base according time series, regional coverage and new data
• General data demand survey

4.4.2 Preliminary proposals of a methodology for the integration of heterogeneous databases

A multidimensional approach of databases

The information which is useful for the ESPON programme (in general) and for the building of political scenarios (in particular) can be described today as a set of coherent databases in which the three following important dimensions (see. Figure 2) are more or less developed:

- Thematic dimension (V)
- Spatial dimension (S)
- Temporal dimension (T)

In most cases, it seems impossible to develop one of those dimensions without reducing the others. This can be illustrated by the following examples:

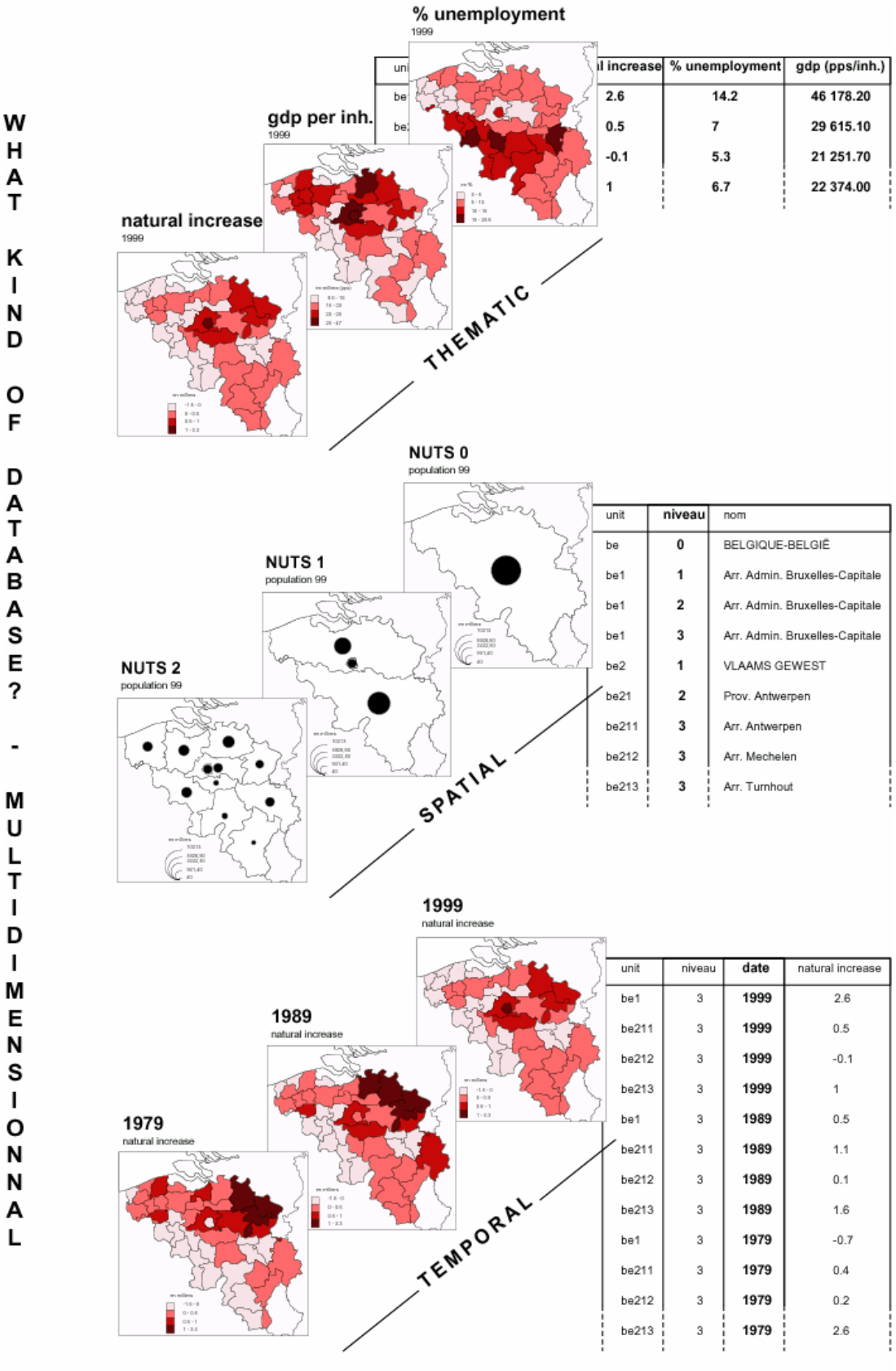
The **Espon regional database** (V=High; S=Medium; T=Low) is characterised by a relative diversity of indicators but those indicators are available at a medium spatial level (NUTS2 or NUTS 3) and can generally not easily be transposed at a lower level of aggregation (NUTS 5) in order to produce - for example - good indexes on urban areas and polycentrism. But the most important weakness of this database is the temporal dimension, which is limited to the very short 1996-2000 period in most cases.

The **Corine Land Cover** database (V=Low; S=High; T=Medium) is characterised by an opposite situation, with a very high level of spatial resolution (100-200 m in vectorial format, 1 to 2 km in grid format), but with a very low amount of information (land cover), not always very well harmonised (cf. technical reports) and currently available only for one time period (1990). The temporal dimension will be, of course, strongly improved when the new version of CLC 2000 is available, which is not the case at the moment.

The **World Development Indicator** database of the United Nations (V=Medium; S=Low; T=High) is characterised by a high level of time resolution (yearly time series for most indexes) with a relatively important diversity of information. But the main weakness is the low level of spatial resolution which provides very few solutions for the description of regional differences in Europe.

As a consequence, this multidimensional approach is a crucial challenge for the ESPON programme because the development of good political scenarios and the revision of ESDP suppose precisely a high level of quality in each of the three dimensions. The aim of the present work package will be to effectively examine the possible solutions that may be applied to existing databases in order to improve their quality and their political significance.

Figure 2. A multidimensional approach of spatio-temporal databases.



uni	l increase	% unemployment	gdp (pps/inh.)
be	2.6	14.2	46 178.20
be	0.5	7	29 615.10
	-0.1	5.3	21 251.70
	1	6.7	22 374.00

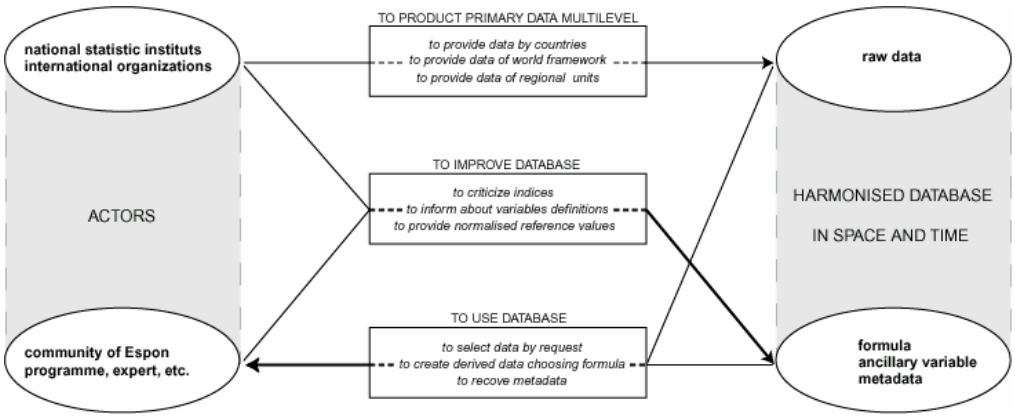
unit	niveau	nom
be	0	BELGIQUE-BELGIË
be1	1	Arr. Admin. Bruxelles-Capitale
be1	2	Arr. Admin. Bruxelles-Capitale
be1	3	Arr. Admin. Bruxelles-Capitale
be2	1	VLAAMS GEWEST
be21	2	Prov. Antwerpen
be211	3	Arr. Antwerpen
be212	3	Arr. Mechelen
be213	3	Arr. Turnhout

unit	niveau	date	natural increase
be1	3	1999	2.6
be211	3	1999	0.5
be212	3	1999	-0.1
be213	3	1999	1
be1	3	1989	0.5
be211	3	1989	1.1
be212	3	1989	0.1
be213	3	1989	1.6
be1	3	1979	-0.7
be211	3	1979	0.4
be212	3	1979	0.2
be213	3	1979	2.6

ESPON-EUROSCOPE: an experimental database for European Spatial Planning and political scenarios

In the framework of a partnership between ESPON 3.2 and EUROSCOPE, we propose to experiment on a new database structure which will follow very strict principles of quality control (see Figure 3 and Annex I) and will offer at the same time pragmatic solutions for the elaboration of long term time series on basic indicators. The crucial challenge of this database is to propose an evolutive database structure which could be improved step by step. The basic principles of this database are summarised below.

Figure 3. General objectives.



Principle 1: The starting point is distributions over the world at state level in 2000: whatever the variable considered (population, GDP, infant mortality rate, unemployment), it will first be collected at world scale for states in 2000. The choice of the world framework is of course symbolic (any statistic on the European territory should be compared with the rest of the world), but it also offers the great advantage to avoid any a priori definition of Europe. At any moment, it will be possible to enlarge the area of interest. The choice of states as initial territorial divisions is also compulsory as far as all statistics are normally produced by states and cannot exist at regional level if they are not available at national level.

Principle 2: Times series are first established at state level for the target period: whatever criteria we want to analyse, the first step is to examine if it is possible to establish coherent time series at state level. Indeed, the establishment of time series at state level will quickly reveal the possibility or impossibility to obtain some criteria (e.g. GDP for East European countries before 1989). Furthermore, it will provide normalised values of reference which can be used for the correction of regional statistics which are not necessarily easy to compare through time. This collection of series at state level is of course a good opportunity to distinguish between real information (census) and indirect estimations or interpolations.

Principle 3: The regional distributions are established in the official units of each state at each time period. It is important to collect the data produced by states 'as they are', without trying in a first step to perform some spatial or temporal harmonisation. What is important is to identify precisely the 'STU' (Spatio-Temporal Units), which are the territorial divisions available in a given state during a given period. And this should be done very carefully as there are many examples of STUs which are subject to small changes, not visible on maps but susceptible to produce important mistakes in statistical analysis[1]. For each state and, in certain cases, for each statistical board of each state, the prior work is to establish the precise dictionary of the different STUs which are used for statistical collection during the period of interest. For practical reasons, the collection of the STUs may be limited to a minimum level (like NUTS3) but the database should stay open to the possible use of a lower level of territorial division (like NUTS5).

Principle 4: The development of harmonised time series can be achieved in different ways which are not pre-defined. Indeed, the great mistake of most projects of long-term database is to propose a priori one

[1] For example, when a NUTS2 or NUTS3 unit is increased/reduced by some local NUTS5 units. This does not imply any change in the name of the units or in their mapping, but it can give the false impression of very high increase/decrease in population.

solution for the production of harmonised time-series, whatever this solution may be (aggregation-disaggregation procedures, smoothing methods, AI, expert system, etc.). In our point of view, as there are many possible solutions for the development of harmonised time-series of indicators, it is important to allow them. It is crucial to avoid the confusion between the original information (data as they are collected by states) and the derived information (methods which are applied to these data for the achievement of harmonised series). The database should store the different methodologies which have been elaborated to solve, among others, the Modifiable Area Unit Problem[1], instead of storing the results of a given methodology.

Principle 5: The problem of quality is not to reject approximations but to control them by confidence levels. It would not be satisfying to propose dogmatic rules of statistical harmonisation without a certain level of approximation. When territorial units are absolutely different from one period of time to another (e.g. Portugal, Poland, etc) it is impossible, or at least very expensive, to establish perfectly coherent time series. However, it is possible to reach relatively good approximations by using ancillary variables like surface, population, land use, common to the units of both periods. In the framework of the ESPON programme, it will be necessary to be pragmatic and to use these approximations because we do not have sufficient resources for real harmonisation. But in such a situation it is crucial to very strictly control the approximation which is introduced in the calculated indicators and to have confidence levels of the results.

Technical specifications: data modelling

The design and development of the Espon-Euroscope database constitutes a two-phase work which will rely on existing advanced and open source technologies. Choices concerning these two consecutive phases are the following:

Design choices: the conceptual model of this database will be described using the standards of the Unified Modelling Language. The proposed model will have to meet the requirements of the five principles presented above.

Development choices: The development phase of the Espon-Euroscope database will consist in implementing the conceptual model elaborated in the design phase. At that time, no particular choice has been made yet with regard to the DataBase Management System (DBMS) to be used, except that a non commercial solution is favoured. Carrying on with this open-source solution policy, a XML-based solution would be worth considering, either by using a XML-convertible DBMS or by directly producing XML files. This XML solution, which has to be carefully studied, would facilitate the exchange of both the data and the schema (model) of the Espon-Euroscope database.

The design phase makes abstraction of the final technical choice and focuses on the requirements given by the five principles described above. Then, the three dimensions presented in section 'Multidimensional approach of databases' have to be addressed by the data model we propose:

1. Spatial dimension: this dimension of the model contains general information (eg. name, location, outline...) about the geographical units handled by the database. In particular, this dimension will be in charge of the definition of new units: independent or based on the aggregation/disaggregation of existing units. A geographical unit obtained from others by aggregation will contain a link to each of them. A geographical unit obtained from another one by disaggregation will contain a link to this unit. Common spatial relations which stand between units will be easily derived from the stored spatial information.

2. Thematic dimension: this dimension gathers information about indicators (eg. name, census source, value, mark of confidence...). In particular, this dimension will be in charge of representing and storing the definition of new derived indicators whose computation involves other indicators.

[1] The *Modifiable Area Unit Problem* (MAUP) has been recognized since the 1970s as one of the most difficult challenge for geographers, cartographers and spatial analysis. As recognized early by many authors (e.g. S. Oppenshaw), the cartographical pattern of the spatial distribution of variable or the level of correlation between two variables distributed in space can be completely modified according to the level of aggregation of spatial units or more generally the spatial grid used for the collection of spatial information. The MAUP has very deep consequences, from theoretical, methodological and practical points of view, and is a major challenge for all researchers or planners using spatial information for statistical or cartographical purposes. For more details, see Grasland C., 2000, 'Facing the Maup', *Hypercarte Working paper n°3* : http://umr8504.parisgeo.cnrs.fr/cg/hyperc/wp3/wp3.htm

3. Time dimension: this is the key dimension of the model. Each unit and indicator will be linked to a temporal entity, either an instant or a period (interval) of time. The handling of temporal information will enable the elicitation of time-series of indicators. Temporal relations which stand between units will be easily derived from the stored spatial information.

These three dimensions will be interdependent in the model. One the one hand, geographical units (GU) will be defined, among others, by their location, their boundaries and their period of validity. One the other hand, indicators will be associated with an instant (or a period) of validity. Then, geographical units will be linked to indicators. Consequently, the model has to meet several requirements to ensure the consistency of the data. Some of these constraints are listed below:

• Given a GU defined over a period of time P, for a given indicator I, there exists a sequence of zero, one or several time-ordered values of the indicator I. Each of these values must be valid during an instant (or a period) of time Q which is included in P (or whose intersection with P is not empty). Intervals of time associated with the values of this sequence can overlap.

• Given a GU, whether independent (for instance a GU representing a state) or dependent (obtained by aggregation or disaggregation)), if the value of an indicator I has been obtained by interpolation, the model will store the formula.

• Let I be an indicator defined over a period of time P, and GU1 and GU2 two dependent units (linked for instance by aggregation/disaggregation) defined over two periods P1 and P2. GU1 and GU2 can share the same value for I, if and only if P1 intersects with P2 and P is included in the intersection of P1 and P2. For instance, GU1 could be a state, GU2 a region of the GU1 state, and I the density of population over a given period where GU1 and GU2 co-exist.

• Let I be an indicator defined over a period of time P, and GU1 and GU2 two independent units defined over two periods P1 and P2. GU1 and GU2 can share the same value for I, if and only if P1 and P2 are included in P. For instance, GU1 could be a state, GU2 the same state as GU1 but at a different period and with probably other territorial divisions, and I the density of population over a period including the periods of validity of GU1 and GU2.

• Given a GU (called composite), obtained by aggregation of two or more existing units (called components), no constraints a priori is set on the period of validity of composite GU. In other words, a composite GU could be built from different components whether or no its period of validity intersects with the periods of validity of the components GU.

• Given a GU (called component GU), obtained by disaggregation of one existing unit (called composite GU), no a priori constraint is set on the period of validity of the component GU. In other words, a component GU could be built from a composite whether or no its period of validity intersects with the period of validity of the composite GU.
Moreover, the spatial and temporal dimensions should allow to formulate queries involving spatial (eg. distance, neighbourhood, location...) and/or temporal (eg. when, during, after, before...) for a given set of geographical units and/or a given set of indicators.

Timetable (Roadmap)

• ***May 2004****: Agreement between ESPON and EUROSCOPE on the project of a long term database (rights, intellectual property...)*
• ***May 2004 - December 2004****: Achievement of technical specifications (data modelling). This step will include a test phase of validation on a set of elementary data (population, area size).*
• ***December 2004 - December 2005****: Data collection & harmonisation for basic indicators 1960-2000. The list of basic indicators will include demographic data (age, sex, birth, death) and economic data (GDP or equivalent measure, activity). Improvement and generalisation of the data model.*
• ***May 2005 - May 2006****: Estimated projection of basic indicators for 2000-2040. This step will be based on the quantitative and qualitative models developed in ESPON 3.2.*
• ***June 2006:*** *Recommendations for further development of ESPON database. A critical evaluation of the database will be realised in order to propose recommendations for further development of ESPON database.*

4.4.3 ESPON GIS - New maps for a wider spatial view - towards cartography without space?

The geographic information specially designed for ESPON covers the key elements

- GIS and map making facilities
- Web base GIS
- Hyperatlas

It is accompanied by the ESPON Policy Support System, an integrative web based tool with information on ESPON and ESPON results and other related information.

ESPON CARTOGRAPHY

A common cartographic design and the necessary cartographic facilities have been elaborated by project 3.1.

The **ESPON GIS** covers three aspects:

- purpose-orientated map layout (special narrow regional, European and broad European including the Mediterranean)
- different regional levels (NUTS)
- regional NUTS classification for versions of 1999 and 2003

Those map making facilities will be adjusted, updated and supplemented according the special need by project 3.2 in case. Continuity will be guaranteed in respect of the cartographic support of the project and the network.

Questions to be solved in the project are related to the regional coverage and the way of the representation of global aspects. The cartographic approach in the ESPON vision of Europe in the world will be the starting point for the development of an ESPON design related to this.

WEB-BASED GIS

The **Web-based GIS** as tool for the visualisation of indicator in choropleth maps via the Internet will be introduced in a revised version in May. It comprises general mapping facilities for broader public use and a more complete GIS tool for the use within the projects. The future use of this tool after the end of project 3.1 has to be guaranteed outside the scope of this project.

HYPERATLAS

The **Hyperatlas** will be a stand alone spatial analysis tools distributed on CD-Rom which allows a multiscalar approach to ESPON data and indicators in the relationship between themselves and different spatial aggregates. The import of own generated indicators will be possible in the final version.

SCENARIO VISUALISATION

Beyond map making and GIS facilities, the project faces the need to create its own scenario oriented (carto-) graphic language. Depending on the scenarios envisaged (spatial and thematic approach), the forms of representation reach from the cartography of spatial tendencies to a cartography without space (or territory).

For the visualisation of spatial trends and scenarios the language of cartographic symbology needs a graphic and thematic generalisation. An elaboration of the existing cartographic idioms used in scenarios up to now concerning the suitability and strength in visual perception must be a first step. The creation of an ESPON cartographic scenario language will be the result of this process.

On the way from the cartographic representation of spatial processes and developments to a visualisation of spatial objectives and option within the thematic scenarios, the regional and spatial reference will be left more or less aside. In this respect the project needs to visualise its results in a cartographic language according an info-(carto-)graphic translation to find a way of the representation of the underlying spatial processes and characters.

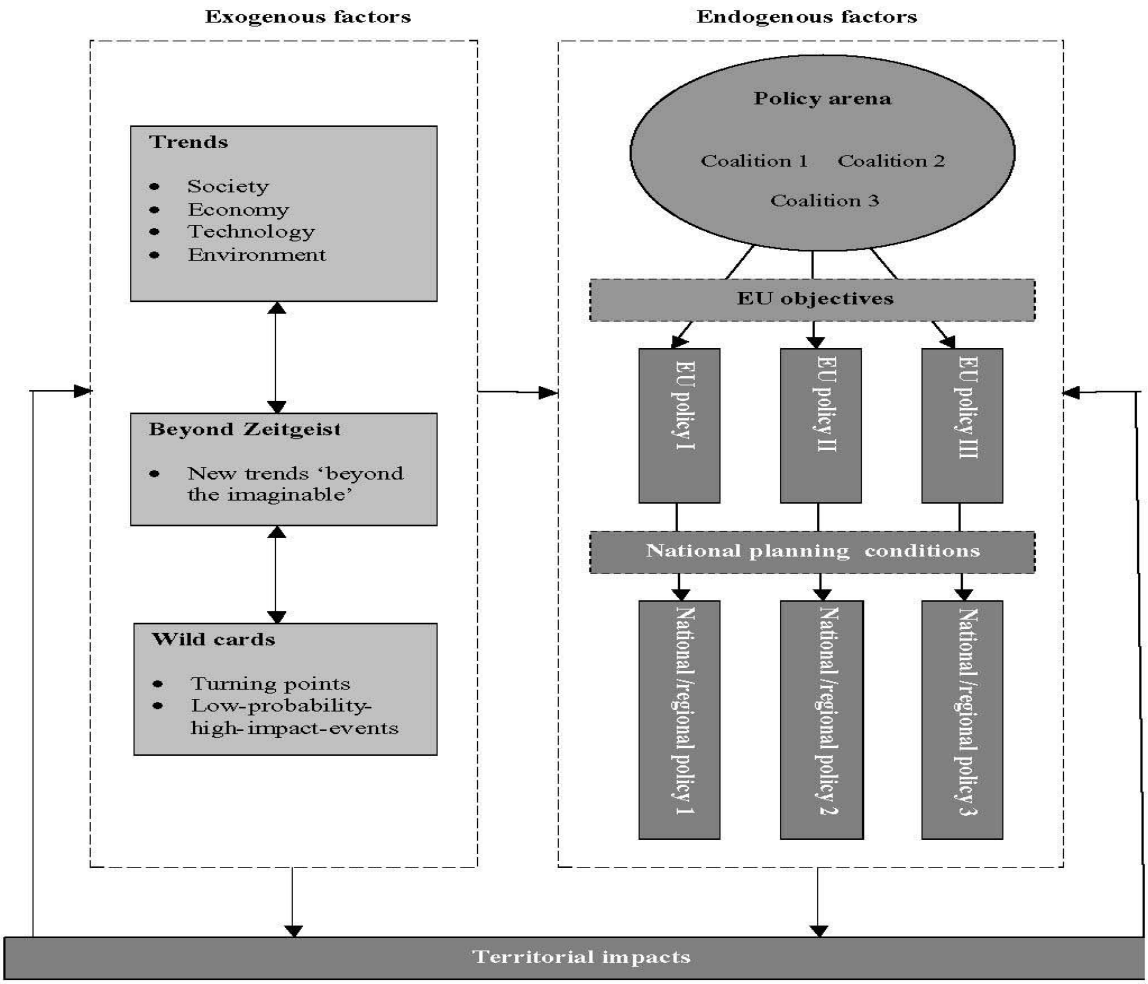
5 State of knowledge about territorial impacts of driving forces and EU policies

5.1 Introduction

The scenarios developed in the course of the project will provide a broad overview of the uncertainties policymakers and stakeholders involved in EU decision-making and in the implementation of EU-policies may face. The reactive scenarios will explore the possible future courses of societal trends, e.g. demographic and economic trends, called 'driving forces' and the uncertainties related to the future dynamics of society. The proactive scenarios will propose the (policy) paths that need to be followed in order to reach specific desired futures. Therefore, it is important to analyze, on the one hand, the courses of dominant trends, the emergence of new trends and the occurrence of disruptive events, and, on the other hand, the actual impacts of policies (such as Common Transport Policy and the Common Agricultural Policy), including the factors that change these policies. Trends are the subject of the ESPON priority 1 projects and policy impacts of ESPON priority 2 projects. Within our project we will synthesise the existing information and focus on the spatial impacts, with special attention to their influence on the spatial policy objectives.

In order to assess the present state of knowledge about the territorial impacts of driving forces and EU-policies in a systematic way we adopt a system approach (compare Sabatier & Jenkins-Smith, 1993). Figure 4 provides an overview of this approach. The text below describes its most important elements.

Figure 4. Overview of the system approach.



5.2 Exogenous factors: driving forces

Driving forces influencing territorial development, but being beyond the control of the policy system, are considered as exogenous factors (left block in figure 4). Here two types of driving forces can be distinguished, trends and beyond-zeitgeist. Whereas trends discuss the existing developments, the beyond-zeitgeist part tends to approach the un-thinkable, which is cut out of current debates. Generally, the interest is on discontinuities – be it in form of new trends, enforcement or growing importance of existing trends, or the overlapping of different trends leading to new development.

5.2.1 Trends

Driving forces for territorial development are generally broad social, environmental, economic or territorial trends, originated by forces outside the control of the entity whose future is being determined. This includes both established and newly emerging trends within the various sectors and broader mega-trends. Once main

trends influencing territorial development are identified, the drivers and forces behind these trends need to be analysed.

Thus the discussion of driving forces for territorial development is related to the work carried out under strand one of the ESPON programme plus the consideration of more general trends discussed in the field of future studies. This involves forces originating from society, economy, technological change and the environment.

Society

Two main types of forces originate from society. On the one hand we have forces related to demographic development and on the other hand forces in the field of life styles and values.

Demographic forces. Changes in demography in all EU/EEA countries will stress the welfare state, the division of labour between households, public and private sectors. Europe's population is aging, and in wide parts also declining. The natural population changes related to the aspects of fertility are accompanied by migration tendencies. Migration takes place within the European Union, as well as into the European Union and major migration issues to be discussed in terms of driving forces for territorial development are labour migration, replacement migration and grey migration. Immigration flows may favour certain regions, especially large cities and bring the danger of urban slums, increased segregation and tensions between groups and population.

Life styles & values forces. The issue of migration implies socio-demographic shifts, such as e.g. increasing urbanisation and increased polarisation within countries. While there are trends towards multicultural societies, at the same time trends towards cultural tribalism and ethnicity, identity crisis caused by conflicts between culture and conscience can be observed. A key word is universal individualism associating from time to time with multiple purpose-oriented and local based communities. New values are emerging, involving radical elements as traditional political movements shrivel and disappear. New family structures are emerging and life is decreasingly divided into childhood, education, labour market participation and retirement. Education, labour market participation and retirement are increasingly becoming flexible elements of the design of individual life-plans. These elements will be combined and altered in various forms. Another aspect to be considered are the emerging difficulties for welfare states, as private solutions are increasingly replacing public sector solutions and protectionist tendencies will become stronger as the pressure on the welfare systems increases.

Economy

Forces originating from the economy are very much related to the question of globalisation understood as the free movement of capital, goods and services across national boarders. This translates into terms such as flexibility and management and aspects of territorial concentration and location behaviour of enterprises. Increasing tribalism and ethnicity may also bring changes.

Europeanisation. Free trade in the enlarged EU and related changes of tariff and non-tariff barriers within the single European market (incl. free movement of people, goods and services) will have territorial impacts. Marginal areas may loose the present protection and support. Privatisation might be another aspect to be mentioned here.

Globalisation. We are witnessing an increasing economic integration across the globe. Effects of free trade within the WTO may also show territorial effects within European. In particular 'offshoring' or territorial outsourcing of manufacturing production is moving from Western Europe to the new EU Member States and increasingly to Asia. Similar tendencies of international division of labour are in sight for the service sector. Thus the relations of Europe to the rest of the world will influence the territorial patterns within the European Union. Also management and consumption process are increasingly globalised.

*Whereabouts***.** As already illustrated in the globalisation section, locational behaviour of enterprises (place based vs. mobile factors) is changing and thus impacting territorial development. This regards both global

localisation patterns as well as national or European ones, where we see tendencies towards agglomeration economies, i.e. concentration and polarisation of economic activities and population. Future hotspots are likely to be linked with new thematic fields of interest (for R&D and new economic growth). Indeed, there is growing evidence that at least some types of inter-firm knowledge creation and operation take place within confined territories because particular technology leaders are present there, or because local authorities are particularly skilled in promoting learning among local firms.

Technology

Increasingly, speed will be a dominating factor. In terms of technological innovations this translates into three fields of interest: information society, transportation and energy.

Information society. Access to services of general economic interest is increasingly becoming an issue where information society and computerisation meets territorial patterns, as locations of traditional services are partly moved to the internet etc. The general aim of good access to information & knowledge comes increasingly in conflict with intellectual property rights, as well as single company interests. This dilemma may reverse a number of developments towards easy and free access to information we are seeing today, and may hamper innovation.

Transportation / accessibility. Physical accessibility is acknowledged as important element of regional development and territorial cohesion. There are demands for affordable, fast, safe and sustainable transport solutions supporting tendencies towards increased traffic and endless mobility. Increased integration and low cost airlines will lead to new mobility patterns.

Energy. Affordable and safe energy which is preferably saveable, distributionable and sustainable is demanded. Shift to alternative energy sources, as well as increasing oil prices (as reserves come to an end) will have an impact on many sectors and influence territorial development not at least via changed transportation patterns. Securing oil sources and energy pipelines might be another issue showing territorial effects.

Environment

Forces originating from the environment comprise in particular climate change and natural hazards. At issue are not just environmental trends but also their linkages with socio-economic changes, which make the challenges considerably more complex.

Climate change. Global warming, change of golf stream and melting icecaps etc. imply a series of territorial impacts. They may lead to changed agricultural and industrial patterns and not at least tourism (and welfare migration) flows. Climate change has both a gradual change dimension as well as a potential for sudden dramatic events which are addressed under the hazards section.

Natural hazards. Natural hazards, such as floods, droughts or storms, are related to the climate change issues. There is an increased risk of floods, landslides and avalanches as the result of an increased frequency and intensity of climate events. These events would have dramatic consequences for river management, snow conditions etc.

5.2.2 Beyond-Zeitgeist

The discussion of societal trends influencing territorial development and the driving forces behind them is mostly characterised by issues that are currently predominant in discussions within policy-making and academia. The beyond-Zeitgeist debate is useful for guaranteeing that the trends discussed above are of a more sustainable nature and not just currently fashionable. Thus it is necessary to approach aspects that are currently un-thinkable, assumptions that are so widely accepted that they are not noticed, and in consequence not questioned.

The beyond-zeitgeist discussion tries to highlight existing trends which do not have a prominent position in contemporary debates. In difference to the wild cards discussed later it does not focus on major impacts and unlikely developments. This can e.g. be approach through expert workshops.

5.2.3 Wild cards

Future studies have experienced remarkable development in the last two decades, which need to be taken on board. They have departed from the planning optimism which characterised their earlier days and still today can be found in the world of evidence-based policy making. Furthermore, it has been realised that there is always a chance that dramatic events change the whole image of the future, the way it is thought about, the concepts used and the goals aimed at. Standard examples for this are the collapse of the communist block resulting in the EU Enlargement, September 11 or the oil chock. As discontinuities they lead to the failure of prognoses and present challenges for scenario techniques and policy making.

This forces us to think beyond the usual trend analysis in territorial development. We need to try to catch the wild cards, i.e. discontinuities in current trends or structures seen as developments or events with a relatively low probability of occurrence but a high impact on territorial development. Like some sudden events, accidents or catastrophes, such breaks in trends or structures may be traceable to processes which transpire unobserved for some period of time because they have not drawn public or scientific attention to themselves. The gradual, unnoticed processes are 'creeping catastrophes' in contrast to acute, catastrophic events. Creeping catastrophes culminate in events which are apparently indeterminate, unpredictable and confusing and which represent a serious challenge for policy-makers and the political system as a whole.

Wild cards very often evolve in just the same way. For a while they prepare in hidden, latent form. Then, suddenly they become manifest. Therefore wild cards are characterised by the fact that they take decision-makers in government or business by surprise – either as results of a creeping catastrophe or analogous to them – and thus provoke often non-systematic, or even inadequate and inappropriate reactions. To a certain extend, wild cards can be understood as qualitative counterparts to the concepts of chaos in the theory of dynamic development. Key words are in both cases low probability and high impact.

This approach should help structure the discussion on driving forces of various kinds and to achieve a better overview on which issues are necessary to address in the framework of ESPON. First tentative ideas on wild cards are:

- Development of the EU:
  - End of the Commission, end of €, withdrawal from some Member States: this is the negative scenario
  - New major enlargement (not only Turkey, but also Russia), United States of Europe and end of national states: the opposite scenario where EU get stronger
  - External immigration stopped (due to crisis): 'Fortress Europe'
- Political events:
  - Strong Russia – new conflicts: weak Russia now has allowed expansion of EU and NATO. What happens after a Russian recovery?
  - Europe in war (over oil?): war on EU territory will change the development path
  - Fundamentalism in Europe,
  - Territorial cohesion taken seriously, and polycentric policies implemented
- Economic events:
  - Deep depression, mass unemployment
  - Terrorism or accidents can threaten the economy if they happen in the 'wrong place': can have major impact on the way society is managed
  - Breakthrough in the fight against poverty: a wealthy Africa
- Environment:
  - Gulf stream changing (very unlikely in our timeframe!)
  - Infectious diseases (human, animal)
  - Global food crisis

- Technology:
  - Breakthrough (science fiction become true and problems are solved): new energy sources found, new ways of transport and communication, new medical innovations increase average living age to 130 years
  - Breakdown (problems not solved, only increasing: communication breakdown (physically and electronically)

Certainly for each issue discussed the 'five whys and the five hows' need to be applied, i.e. why is this a driving force etc. This implies that it is always necessary to take at least five steps backwards (why) or forwards (how), by posing the question 'why should turn out like that' or 'how should that be achieved' to every trend.
The question will be posed until this procedure has been repeated five time, i.e. five steps backwards of forwards have been taken. Systematically going five links in the chain of argument put forward for a driving forces, will allow to identify main drivers behind developments and trends and even to analyse whether different development are varying expressions of the same driving force.

In case the project decides to work with territorial typologies, the discussion of driving forces can be carried out for each singe territorial type.

5.2.4 Territorial impacts of driving forces

After having identified a number of issues conditioning future territorial development, their territorial effects need to be discussed. Given the focus on territorial cohesion and polycentric development, the effects of a driving force on the main element (morphology, functional specialisation, accessibility and co-operation) needs to be discussed for each of the three geographical levels (micro, meso, macro).

Table 3. Different territorial impacts of driving forces.

GEOGRAPHICAL LEVEL **ELEMENTS OF TERRITORIAL COHESION**	**Micro:** regional level – i.e. effects within the case study region	**Meso:** national, trans-national level – i.e. effects regarding the status of the region in a wider context	**Macro:** European, international – i.e. effects regarding the status of the region in an international context
Morphology, distribution of population (e.g. increase, concentration, spreading of population as important element for the critical mass for polycentric development)			
Functional/economic specialisation (e.g. strengthening of existing profile or division of labour between various places, development of new profile/niche leading to increased competitiveness)			
Connectivity/accessibility/transport (e.g. improvement of links, removal of bottlenecks, development of hub-functions)			
Strengthening of international co-operation (e.g. co-operation between public sector agents, private business co-operations)			

Other aspects to be considered are the environment and quality of life, which are however more indirect influences on the issues conditioning future territorial development focused on by ESPON.

5.3 Endogenous factors: EU-policies

The EU-policies and their implementation belong to the endogenous factors affecting the EU territorial development (right block in figure 4). The first and most important part of the analysis consists of the relevant EU policies and their territorial impacts. This analysis is also the most detailed. We concentrate on selected *EU policies* that generate the most important spatial impacts in the EU territory: Common Transport Policy, Common Agricultural Policy & Rural Development Policy, Regional Policy, Common Environmental Policy, and Research & Development Policy. Our assessment of the state of knowledge about these policies and their territorial impacts is described in the sections below.

Moreover, we take into account the ways in which the policies are implemented and the interaction between EU, national and sometimes regional authorities (their governance). This is important because implementation varies according to the planning conditions in the different member states (Newman & Thornley, 1996). We distinguish between: financial programmes (e.g. structural funds), regulations and norms (e.g. Habitat guideline), and spatial visions (e.g. ESDP).

Our analysis distinguishes the territorial base of the EU-policies (eligibility areas) and the territorial impacts (nature and location of actual impacts) (Robert et al, 2001). Moreover, the analysis provides an overview of direct (e.g. location of new habitats because of Habitat guideline) as well as indirect territorial impacts (e.g. new administrative relationships because of EU-funding methods). Furthermore, we distinguish between intended and unintended territorial impacts. In order to do this, we assess the impacts in relation to the EU objectives. Finally, we analyse the impacts on the macro level, the meso and the micro level. While doing this we pay attention to synergies as well as conflicts between the impacts.

The second area of analysis consists of the policy arena and the EU objectives. The *policy arena* defines the rules for the actions of the actors – governmental, nongovernmental and private organizations – and the interactions among them (Faludi, 1999). The rules may be formal (unanimity or majority rule) but also informal (social norms). The policy arena changes over time, for instance because of the enlargement of the EU. Such changes will have significant consequences for future EU policies.

The large numbers of the actors involved in the policy arena come together in several *coalitions*. In most policy arenas the number of coalitions is quite small because of all the factors that push the actors to coalesce in order to act effectively. Together – but often also against one another – coalitions formulate, implement and change the EU policies. They also (re)produce the EU objectives that provide the framework for the policies. While doing this they apply various strategies (informing, lobbying, confronting) and mobilize various resources (decision authority, societal support, money) (Ascher & Overholt, 1983).

From their own points of view the coalitions negotiate the *EU objectives* that are to determine the directions of the EU policies. Important EU objectives are economic competitiveness, economic, social and territorial cohesion and sustainable development. The negotiations take place in formal as well as informal meetings. The ESDP may be considered as an elaboration and application of the EU objectives from the spatial point of view.

The third area of analysis consists of the impacts of the exogenous factors on the EU-policies and their implementation. Like the second area it is only analysed in order to understand how the policies are implemented and how they may change in the future. These analyses will therefore be more general than those of the first area. The dynamics of the exogenous factors can become an important stimulus for the coalitions to change fundamental elements of the policies. This is especially true for new trends (beyond Zeitgeist), turning points, and low-probability-high-impact-events (wild cards) labelled by the coalitions 'a crisis' (Dammers & Kranendonk, 2002).

5.3.1 Common Transport Policy

There is a growing body of literature on the spatial impact of Transport and TENs policies. Most importantly, this is the subject of ESPON project 2.1.1 (Bröcker et al, 2003). This project emphasises transport services and networks. This was addressed in ESPON project 1.2.1 as well. A study about the spatial impacts of Community Policies (Robert et al, 2001) and a study performed by the German consultancy PLANCO (2003) provide additional information on the territorial impacts of the TENs, particularly regarding the cost effectiveness. Also a wide array of policy documents and advisory reports are available at the Member State level. Finally, there is a bourgeoning body of academic literature which takes a critical view of the impacts of TENs policy, particularly with respect to the claim of synergy between transport and other policy sectors (e.g. Richardson & Jensen, 2000; Peters, 2003).

The state of knowledge on the territorial impacts of the EU pre-accession instruments related to transport (ISPA) in the candidate countries is by far not sufficient. The EC and EUROSTAT do not collect the required data and information. The databases of the beneficiary countries are ad-hoc, sporadic and by far not complete. And territorial impact assessment and territorial impact analysis are rather unknown in these countries. ESPON project 2.2.2 developed a preliminary database by collecting the calls for tenders (IRS et al, 2003).

The *direct territorial impacts* of transport infrastructure can be defined as the changes in land use along its route. They act as a link for certain modes, while becoming a physical barrier to other modes. They often result in increased pollution, have a visual impact and change mobility patterns (immediate impacts on congestion and hence travel times).

Transport infrastructure, however, is most interesting for its *indirect impacts*. The changes in mobility resulting from new infrastructure, in particular, are seen as contributing to changes in accessibility and hence economic attractiveness of certain places. By reducing travel time, new infrastructure can alter spatial relationships, as time-space maps illustrate (Vickerman et al, 1999). This underpins the belief that transport infrastructure, by linking peripheral regions, can be used to contribute to *economic and social cohesion*. The extent to which this is actually the case remains the subject of debate. ESPON 2.1.1 points to a slightly positive relationship. The same arguments are valid for the deployment of transport infrastructure to the end of increasing *economic competitiveness* and thus ties into the ESDP, Lisbon strategy and post-2006 regional policy.

The provision of certain kinds of new infrastructure and introduction of pricing measures can affect the modal split. Offering an alternative to intra-European air travel via a high-speed train network, for example, promotes a more environmentally friendly form of travel. Introducing new waterway connections, such as the Rhine-Donau link, will allow ships to penetrate deeper into the European Continent and offer an alternative to road transport (Feenstra, 2000). The choice, therefore, to favour rail and waterways in the selection of TEN priority projects is seen as consistent with wider EU goals on *sustainable development*.

The provision of new infrastructure in certain areas, supplemented with other transport policies (harmonisation of technical standards and procedures) can contribute to greater *territorial cohesion* and facilitate the free flow of goods in the internal market. This is most evident in border regions, which are often neglected in the national network, and are poorly connected to neighbouring Member States.

Designation of TENs can also carry with it a *symbolic impact*. Until now, TENs have been existing projects put forward by Member States rather than European initiatives. Nevertheless, the inclusion of a particular project in the European programme will enhance its chance for funding within the Member State (Faludi & Zonneveld, 1998). If the EU wishes to become more strategic in its designation of TENs, higher levels of funding will be required to shift the local decision-making process.

ISPA (since 2000) aims at the development of the trans-European transport and transport accessibility to different regions in the candidate countries (CEC, 2003b). High shares of the program were allocated to projects improving the accessibility of the candidate countries. But the intermediating and initiating role of

the EU was at least as important as the resources spent. Without EU intervention border crossing-points (bridged, roads, railway lines) and cross border co-operation could not have been achieved.

5.3.2 Common Agricultural Policy and Rural Development Policy

The Common Agricultural Policy (CAP) and Rural Development Policy (RDP) are among the most important EU-policies in budgetary, economic, environmental, and other terms. ESPON project 2.1.3 is an important source of knowledge about the expenditures of the CAP and the RDP (ACRDR, 2003). Territorial impacts were not analyzes because data were not available. It provides a standardised database and an analysis of territorial trends covering the EU-15 and neighbouring and accession states. In addition, it presents an advanced territorial impact analysis and a SWOT analysis of both policies in Europe. A SWOT analysis of territories leads to the identification of problem regions. The regions were not analyzed because that would require a much broader scope of the study. The study about the spatial impacts of Community Policies provides additional information.

The state of knowledge on the territorial impacts of the EU pre-accession instruments related to agriculture (SAPARD) is by far not sufficient. The situation is the same as described above with regard to the pre-accession instruments related to transport.

Agenda 2000 defined two pillars of the CAP and envisaged a gradual shift of expenditure from Pillar 1 to Pillar 2. Pillar 1 contains market support measures, direct payments, and supply management tools: this occupies the bulk of the CAP budget. Pillar 2 covers structural and rural development measures such as Less Favoured Area payments, agri-environmental measures, and diversification. The shift from Pillar 1 to Pillar 2 is also presented as a shift from the sectoral to a territorial approach to rural policy. The CAP and the RDP measures are applied in very diverse ways and their effects tend to be very different according to the type of measure (Peters, 2002). Pillar 1 measures are essentially top-down measures. In contrast Rural Development Regulation (10% of the RDP funds) provides more possibilities to meet the varied local needs of rural areas.

The CAP and the RDP act contrary to the EU objectives of economic, social and, a fortiori, territorial cohesion. This can be attributed to the historical focus on sectoral issues such as improving productivity and ensuring stable food markets. Pillar 1 benefits richer regions and regions with lower unemployment rates. It accrues disproportionately to intensive large-scale farmers because it is coupled (directly or indirectly) to the level of output. Regions with larger farms receive higher levels of support. Since small farms are more prominent in southern regions of the EU this generates an uneven distribution of territorial impacts. The location of the region also plays an important role: the more accessable regions in the EU receive higher levels of support. Pillar 2 also conflicts with economic and social cohesion. The higher levels of agri-environmental payments, for instance, accrue to richer areas of the EU (Dwyer et al, 2002), for richer regions tend to prioritise agri-environmental objectives more than poorer regions. On the other hand the least accessible regions receive higher levels of support. The shift from market price support to direct income payments has helped to weaken the contradiction between the CAP and the cohesion objectives.

The CAP also conflicts with the EU objective of sustainability. The productivist orientation of the CAP until the early 1990s supported increasing levels of intensification and specialisation which have resulted in a wide variety of negative environmental impacts: reductions in biodiversity, erosion of soils, pollution etc. Such impacts, however, tend to be very territorially specific. Since the early 1990s the relationship between agriculture policy and environmental policy has changed (Baldock & Dwyer, 2002). Concepts like environmentally friendly farming and multi-functional farming are promoted since then. Moreover, a significant number of EU environmental measures, frequently supplemented by national and regional measures, affect agricultural production.

Furthermore, the CAP conflicts with EU objective of polycentricity (Robert et al, 2001). The CAP generates very discernible spatial impacts. Decreasing peripherality (increasing accessibility) is positively associated with higher levels of Pillar 1 support. Pillar 2, however, generates the opposite impact: the least accessible regions receive, on average, higher levels of support.

By the end of 2002 only seven of the eligible candidate countries were approved to get recourses from the SAPARD program. The main aim of this program is to facilitate compliance with the CAP and the standards of sustainability and diversity in rural areas (CEC, 2002).

5.3.3 Regional Policy

As the Structural Funds are regional financial instruments, the focus of activities is in most cases on economic aspects of development, thus often not necessarily specifically targeting spatial development issues. Most of the existing studies focus on the evaluation of Structural Funds according to their regional development aims. The study on the Spatial and Urban Dimension of Objective 1 and 2 carried out in 1999, as well as the current ESPON projects 2.2.1, 2.2.2 and 2.2.3 are the only studies addressing the spatial dimension of Structural Funds (Nordregio et al, 2003; IRDSP, 2003; ECOTEC, 2003a). These studies focus on EU 15 + 10 and only cover the Objective programmes. More detailed knowledge on Interreg seems not to be available. Regarding the methodologies funding information for the previous period and case studies are predominant.

The state of knowledge on the territorial impacts of the EU pre-accession instruments related to regional development (PHARE) is insufficient. The situation is the same as described above with regard to the pre-accession instruments related to transport and agriculture.

However, the projects provide an indication of various types of territorial impacts (Bachtler & Taylor, 2003). At the macro level, direct effects are mainly related to the question on where the assistance is spent. The distribution of funding and the way in which it is divided between the addressees of an intervention, rather than the purpose of spending is relevant. The main part of the assistance goes to areas outside the pentagon and more specifically to urban nodes outside it, which can be seen as a potential contribution to a more balanced and polycentric spatial development.

At meso level, Structural Funds contribute to polycentric development through the programme-specific priorities. The main aspects with relevance to polycentric development and territorial cohesion are endogenous development and increased regional competitiveness. In some cases, especially linked to the improvement of national transportation infrastructure, Structural Funds can also have influence on the polycentric development at meso level. This is the case in relation to measures addressing the regional access to the hinterland and its surrounding market, as well as targeted connections between neighbouring urban areas and the hub functions to the global market, which are supported by Structural Funds. Furthermore, Structural Funds have had an impact on the creation of regions within countries and across national borders.

The most concrete examples of territorial impacts of Structural Funds have been documented at micro level. Structural Funds have an influence on the morphology and functional specialisation of urban areas, e.g. on the allocation of economic clusters, green structure or activities within a city and more particularly within the field of combating segregation. Structural Funds can also influence the economic profile of urban areas. This type of profiling and specialisation involves activities strengthening the possibilities to become an engine for economic development for a wider region. Furthermore, Structural Funds certainly influence the accessibility and connectivity of an urban area. Modernisation of local transport systems, integrated transport planning, etc. contribute to an important degree to communication within as well as between the urban areas.

Structural Funds have not only effects through the amount of funding spent. The implementation system has significant effects as well, e.g. support of new thinking, leverage of national policies and promotion of trans-national links (Böhme, 2002). These effects can result in more important territorial impacts than the direct effects discussed above. Furthermore, the amount of funding does not seem to be of importance for the agenda setting effect. These types of impacts as well as knowledge on the implementation processes will be addressed in future case studies.

In the first period the main objective of PHARE was to provide support for the CEECs in the process of economical and political transformation. In the mid-nineties it evolved into the instrument supporting the CEECs in their institutional and socio-economic preparation to accession (CEC, 1999). PHARE improved

the regional market potential. Moreover, it had a significant 'demonstration effect' and impact as a model for the management and regulation of national resources.

5.3.4 Common Environmental Policy

Although considered by many to be one of the most spatially relevant policy sectors, only ESPON project 1.3.2 and to a certain extent 1.3.1 are devoted to it (Royal Haskoning et al, 2003; GSF, 2003). The study about the spatial impacts of Community Policies mentioned above also pays attention to it. As it now stands, examples of how EU Environmental policy affects spatial developments will mainly need to be derived from the Member State level. For the Netherlands, Freriks et al (2002) and Klinge-van Rooij (2003) are good examples. Correlation of the results of these studies with similar ones performed in other Member States could result in a more reliable overview of the general impact of these policies.

Because all environmental directives must be incorporated in the legislation of the Member State, their effects are inherently indirect. This can also serve as an explanation of the unseen nature of the EU's impact (Van Ravesteyn & Evers, 2004). In the Netherlands, for example, it has been estimated that 80% of all its environmental rules have their origin at the EU level, although the national government usually receives the blame or praise regarding their effects.

The indirect impacts of EU environmental legislation are legion and significant. They have not only resulted in different kinds of environmental qualities, but they have also an increasing impact on land use. In general EU environmental policy has the effect of restricting options for (urban) development, rather than providing incentives (i.e. funds) for certain kinds of development. In Member States with a high level of pollution and congestion (within the pentagon), meeting various EU standards can imply significant spatial measures.

Nature policy. The Birds Directive and the Habitats Directive seek to protect biological diversity in Europe. This is done by identifying important endangered plant and animal species and their habitats and introducing measures to prevent their destruction. More significantly from a spatial perspective is the requirement to ensure that physical interventions do not harm these habitats. As a result of these directives, many building plans have been blocked because they would have resulted in unacceptable levels of damage to designated areas.

Pollution reduction directives. Various EU directives establish criteria for water and air quality that can have indirect impacts on spatial developments. If, for example, homes are planned in areas which have failed to meet EU air quality standards (e.g. along motorways), this can lead to delays or even block implementation. The Integrated Pollution Prevention and Control Directive coupled with the NEC Directive, which sets maximum levels for ammonia, have far-reaching consequences for the countryside (e.g. removal of livestock from certain areas). Regarding noise, Directive 2002/49/EC requires Member States to draw up strategic noise maps, but so far no pan-European standards have been set.

Climate policy. As part of the compliance measures for the Kyoto Treaty, various measures regarding CO2 reduction and a shift to renewable energy sources have been implemented at the EU level. Countries such as Austria will be able to meet this target by stepping up hydroelectric power, while the Netherlands and Denmark will have to rely on wind and biomass sources, implying a need for space for biomass cultivation and windmill parks (Gordijn et al, 2003).

Integration of sustainable development. The concept of sustainable development has been linked to the receipt of funds from a variety of sources including the Structural Funds, TENs and CAP (Buunk, 2003). The introduction of mandatory Environmental Impact Assessments and Strategic Environmental Assessments will further strengthen this. An immediate consequence is that applications for these funds increasingly have to contend with this aspect of environmental policy.

One of the objectives of the pre-accession programs ISPA, SAPARD, and PHARE was to improve the environmental quality. In many regions more than 50 % of the funds were allocated to this objective (CEC, 2003a). SAPARD facilitated compliance with EU-standards of sustainability in rural areas.

5.3.5 Research and Development Policy

The territorial impacts of the EU Research and Development Policy (R&D Policy) are examined by ESPON project 2.1.2 (ECOTEC et al, 2003b). This project explores the territorial impacts of actions undertaken by the R&D Framework Programs and actions aimed at improving R&D capacity undertaken by the Structural Funds (Objectives 1 and 2). Project 2.1.2 consists of a territorial impact analysis, combining a descriptive approach with an analysis of the territorial distribution of the activities. The impact analysis is based on the analysis of several datasets. The synergies between EU and domestic R&D policies are explored in more detailed regional case studies.

The EU R&D Policy plays an important role in the realization of the Lisbon strategy of making Europe in 2010 the most competitive and dynamic knowledge-based economy in the world. This policy consists of two strains, one of which is the *sectoral interventions* which provide direct support to R&D projects and researchers. The main instrument is the RTD Framework Programme, coordinated by DG Research. This instrument promotes cooperation in the field of R&D and dissemination of research results and stimulates the training and mobility of researchers in the Community.

Participation in the Framework Programs is strongly linked to regional R&D capacity. The fact that a number of less favoured regions demonstrate relativity stronger levels of participation suggests, however, a small positive influence on the EU objectives of economic and social cohesion. Although networking and knowledge creation are significant gains they are often limited to the partners involved. Knowledge development is present only in the best cases.

The EU's *territorial interventions* are addressed to specific geographical areas, through cohesion policies and specifically the Structural Funds coordinated by DG Regional Policy. The interventions focus on indirect support of R&D, such as the creation of innovation networks, and work alongside national and regional activities.

The Structural Funds focus on supporting the development of less favored regions. Higher levels of support are allocated to Objective 1 eligible areas than those eligible for Objective 2. Overall, the policy approach is supportive of the EU objectives of economic and social cohesion. The Structural Funds are more strongly supportive of technology transfer and other knowledge building activities than other forms of R&D intervention. The development of R&D infrastructure is most effective when it is well embedded into a strongly functioning regional and national innovation system. The recent launch of a Regions of Knowledge pilot action by DG Research may make an important contribution in this field.

The distinctions between the Framework Programs and the Structural Funds offer an important opportunity to balance the twin European objectives of promoting efficiency and equity in the field of R&D capacity. Efforts need, however, to be directed towards securing closer synergies between the two within eligible regions.

In its overall focus EU R&D policy is appropriate. The Structural Funds and the Framework Programs both make a positive contribution to improving the capacity of regions to engage in R&D and innovation. The R&D capacity, however, is unevenly balanced. Moreover, the potential intraregional benefits of participating in the Framework Programmes seem to be undervalued.

5.4 Efforts to generate new knowledge

The analysis of the driving forces and their territorial impacts belongs to WP 6 of our project. WP 7 contains the analysis of the territorial impacts of EU-policies. In the coming year both work packages will put in a considerable effort in order to generate new knowledge. In addition to the knowledge provided by existing ESPON projects and other literature, knowledge will have to be gathered in order to understand the driving forces, the EU-policies and their territorial impacts well enough to be able to build the reactive and proactive scenarios.

As WP 6 focuses on the qualitative analysis of driving forces, the discussion of the territorial impacts of driving forces will be of discursive nature and mainly based on literature studies, expert workshops and possibly applications of the Delphi-method. The text below describes the research activities. Table 4 provides an overview and a time table.

Identification of major areas of relevance. Through literature studies and brainstorming as well as the use of existing ESPON networks, the main trends and their driving forces for spatial development being of interest for this study will be identified.

Analysis of major driving forces. Based on previous ESPON work and additional literature studies the main driving forces will be analysed. The focus will mainly be on exogenous driving forces at micro, meso and marco level with special attention paid to developments in the new EU Member States and the neighbouring areas. For the literature studies a spreadsheet will be elaborated in order to distinguish between different kinds of driving forces and weight them according to their 'power' and time perspective. The above described approach of the 'five whys and the five hows' will be applied for achieving sufficient depth in the analysis. Furthermore, informal export workshop will be used.

*Discussion on spatial impacts***.** Taking into account the three-level approach and the issues conditioning future spatial development highlighted in the ESPON context, the spatial implications of driving forces identified will be discussed (cf. section above). Using these aspects as point of departure the spatial implications of each single driving force will be analysed. In a second step special emphasis will be on contractions and amplification between different driving forces. Literature and expert consultation will be important elements in this stage of the work.

Collective expert consultation. Having elaborated draft reports on driving forces and their spatial implications, broader expert participation exercises will be carried out. This will be done in conjunction with the Working Package responsible for these tasks (see chapter on consultation). Preliminary plans involve expert-workshop or Delphi rounds for further definition of driving forces and their impacts. Special emphasis will be paid to national diversity as regards both the importance of single driving forces and their spatial implications.

*Wild Card workshop***.** Wild card workshop will be arranged for identifying possible breaks in trends and new trends, as well as possible changes in the spatial impacts of driving forces.

Final write up. The final write up phase needs to bring the different strand together. At this stage, the various driving forces and their spatial implications need to be discussed in an interrelated manner focusing on their integration and policy relevance. In this context it needs to be seen which driving forces reinforce or supersede each other etc.

Table 4. Research activities and time table for WP 6

Task	Description	Time period
1	Identification of major areas of relevance	Autumn 2004
2	Analysis of major driving forces	Late autumn 2004
3	Discussion on spatial impacts	Second interim report
4	Collective expert consultation	Spring 2005
5	Wild Card workshop	Summer 2005
6	Final write up	Winter 2005

The relevant ESPON projects and other knowledge sources provide a lot of quantitative data about the territorial impacts of EU policies. For the CAP, RDP and Regional Policy, however, only data about expenditures (territorial base) were available. Although in all policy areas databases are far from complete all

relevant ESPON projects provide quantitative data about direct and indirect territorial impacts, intended and unintended impacts and / or impacts on different levels. Knowledge about the ways the EU policies are implemented and on the interaction between EU, national and regional authorities, however, is much more limited. Moreover, most of this knowledge, being gathered by several case studies, is qualitative in nature. The same is true for the factors changing the EU policies, like the different coalitions on EU level, the negotiation processes, the changing policy arena and the changing socioeconomic context. More information should come from the new ESPON projects 2.3.1 and 2.3.2. Project 3.2 will keep permanent contact to these projects and guide them so that results will be usable for the scenario building process.

For the making of the proactive scenarios it is important to analyze not only the implementation of EU policies and their territorial impacts but also the factors changing these policies. For each proactive scenario will explore a possible direction of EU policies. This implies that it is very import to gather knowledge about the factors that may change them. In order to get more (qualitative) knowledge about this, it would be desirable for every EU policy described above to do an additional literature review and to interview some key respondents (policymakers, scientists). This can be done, however, only to a limited extent. The table below provides an overview of the intended research activities and the time table for the year to come.

Table 5. Research activities and time table for WP 7

Task	Description	Time period
1	Processing comments made by participants of ESPON seminar	May 2004
2	Reflection on conceptual framework	May 2004
3	Further analysis of relevant ESPON projects	June – August 2004
4	Analysis of other relevant literature	September – October 2004
5	Interviews with scientific and policy experts	November– December 2004
6	Synthesis of gathered knowledge and data	January 2005
7	Writing of first draft report	February 2005

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6 Further necessary data analysis

The scenario building process will be anchored on data analyses produced by the other ESPON projects. However, two types of further-going analysis are necessary: an extension of some analyses in order to include missing elements and multivariate analyses that combine existing indicators into more synthetic visions.

In the first category we have the creation of a new general long-term population and economic database presented in section 4.4.2 and an extension of KTEN model which up to now only includes passenger transport. If we want to estimate future transport needs fully, we need to include freight into this model. The first section of this chapter proposes a methodology on how to do so.

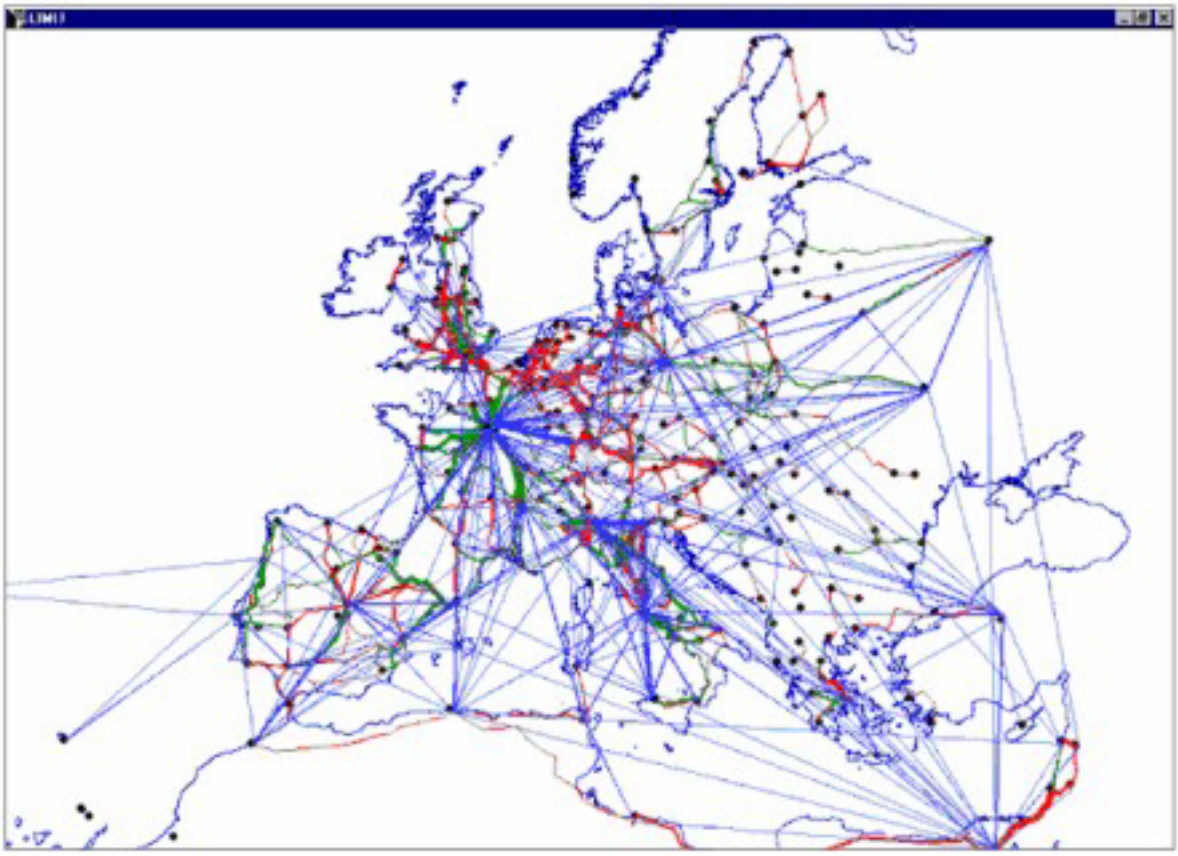
The second type of further-going analysis is represented by the MASST model, which will allow measures of economic performance and predictions on the basis of qualitative hypotheses, and by the European Territorial Cohesion Index, an attempt to create one or several indicators that will allow to validate the scenarios and policy recommendations on the basis of a quantitative measure representing some of the identified policy goals.

6.1 KTEN model

6.1.1 Introduction to the KTEN model

KTEN (Know trans-European Networks) is a passenger traffic forecast model developed to facilitate a strategic analysis of the trans-European Transport Networks on a wider pan-European and Mediterranean scale. KTEN is a sequential 4-steps model, with combined modal split and assignment on multimodal networks (1 complete run of KTEN takes 150 minutes; KTEN is 40 Mb large in total). KTEN uses STREAMS model results, WTO and EUROSTAT Air Traffic OD databases as benchmark and/or reference for result validation. The model has its origin in the UTS study (Unions Territorial Strategies) commissioned by DGTREN and was subsequently improved by the BRIDGES, SPOTLIGHTS and ASSEMBLING projects of the 4th and 5th European Research Framework Programmes. Currently this model is being used as the basis for the passenger and freight DESTIN models, also for DGTREN. Given the positive results of KTEN applied to passenger transport, the model will be extended to cover freight and logistics, based on the results and methods of already existing freight models, such as STREAMS and SCENES and others under development for DGTREN, such as DESTIN. KTEN has already being applied in ESPON 1.2.1. The model will be improved and updated with the latest available ESPON data and used as a tool for spatial scenario-building within ESPON 3.2.

Figure 5. Results for long distance passenger traffic (2000 scenario).



The KTEN model as it stands now, can be characterised as follows:

Abstract	Sequencial 4-Steps European strategic long distance passenger transport forecasting model (Projection: 2000-2025). • Trip generation by ratios (trips per person). • Distribution constrained to origins. • Modal Split combined with assignment of variable Value of Time.
Policy relevance	• Evaluation of transport infrastructure projects and road-pricing policies • Future scenarios with different accessing countries included in the European Union.
Geographical Scale	• EU15 • Switzerland and Norway • Central and Eastern European Countries • North of Africa
Time Horizon	2000-2025
Scope of the model	Strategic
Transport domain	Long distance passenger traffic
Intermodality	Multimodal chains allowed with predefined penalties
Type of transport modeling formulation	Sequential 4-steps, with independent Generation and Distribution, and Combined Modal Split and Assignment
Integration with other forecast models:	Not yet
Integration with decision tools	Not yet
Modeler	Mcrit sl (Barcelona): Andreu Esquius / Meritxell Font / Ramon Català / Andreu Ulied
Proprietor	DG-TREN / ASSEMBLING / Mcrit sl.
Status	Public

Applications	No analysis carried out using KTEN. Used within ASSEMBLING for demonstration purposes
Commercial Aspects	Not yet available, The aim is to disseminate the whole model in CDRom for free. The whole databases and software applications represent some 40 Mb.
Input Database structure	Xls file with socio-economic information and parameters, internal mdb file for Distribution and Modal Split -Assignment matrix storage.
Network definition	• Simplified network: 4.000 links and 2.500 nodes, 3 link types, The network attributes are: Speed, Toll/Fare. No inventory available. • Detailed network as reference (ASSEMBLING graph): 100.000 links and 250.000 nodes.
Zoning	• 295 zones Core zones 285 (EU15 + Switzerland + Norway + CEEC with NUTS II or equivalent zoning plus the rest of Mediterranean by country). • External zones: 10 (including the rest of the world).
Organisational network	No public assignment. Costs based on a kilometric fare with delays (between 0 and 60 minutes) based on a frequency estimation for airlines. Airports were classified by categories and by countries, and frequencies assigned according to pre-fixed rules (based on the UTS Study).
Surveys	None. Some data from National's Surveys used as country trips rates.
Socio-economic	SPESP (DG REGIO), Phare Toolbox, United Nations and different sources.
Basematrix	Used as benchmark: STREAMS by NUTS I, PHARE, EUROSTAT Air Traffic and World Tourism Organisation.
Generalised Cost functions	Road: Separable cost function (delay on road link depends only on the flow on the link itself). O/D flows classified by Different value of time, Kilometric Operational Cost rate (constant) depending on the link + Toll per km. Travel time based on speed. Rail: Modified speed on the links based on scheduled frequency. Kilometric fare based on the speed. Bus: Not considered. Air: Modified speed on the links based on scheduled frequency. Kilometric fare based on the category of Airports connected.
Planned improvements	Development of simplified freight model Development of a policy interface
Types of users, units and vehicles	One user type for passengers
Trip purposes	Business, Leisure and Personal
Time values	EIB values for EU15 Countries, and correlated values with Greece GPD for the rest of the non-EU15 zones
Network calibration process	No calibration because there is no capacity restrain on links. Forecasted traffics validated with United Nations traffic surveys.
Trip Generation	Zone-based ratios (by NUTS 2 or equivalent), depending on: • Trip rates work and study by group of age • Trip rates by leisure + personal trips by GPD • % business/ leisure /personal. Trips per distance depending on Type of Settlement (1,2,3,4,5,6) Based on Spatial Development indicators (SPESP). • Self-containing trips: Internal trip rates • External trip rates: Without calibration. Used STREAMS and other sources as benchmark.

Trip Distribution	Single origin constrained. By trip purpose: Business / Obligated • Relationship between the country belonging to zone (i) and the country belonging to zone (j) • Capitatility index (4 for Europe,2 for capital of the city and 1 for others) • Population of zone (j) • Gross Domestic Product of zone (j) • Cost to travel from zone (i) to zone (j) Vacation/Leisure • Relationship between the country belonging to (i) and the country belonging to (j) • Capitality index (4 for Europe,2 for capital of the city and 1 for others) • Population of zone (j) • Tourist pressure on site of zone (j) • Cost to travel from zone (i) to zone (j) Visit/Personal proportional on predefined values based on Population citizenship on the resident countries. Without calibration. Used World Tourism Organisation statistics, EUROSTAT Air traffics, STREAMS and other sources as benchmark.
Modal Split	Combined with Assignment on a multimodal network
Scenarios	Exogenous hypothesis: Open to the analyst. Key variables: GDP growth, GDP distribution, EU enlargement process and demographic growth, network construction and road pricing.
Periodicity	Average day in the year
Assignment	Combined with Modal Split. All or Nothing assignment with penalties
Sensitivity test	GDP growth, GDP distribution.
Type of the results	Long distance Traffic on road, railway and air-lines links
Output Database structure	OD matrix to be assigned (each OD has three values according to time values) and OD matrices by trip purposes. Traffics per link
Internal Validations	Comparison between forecasted and actual road traffics in links from United Nation surveys carried out internally
Modelling software	Bridges/NIS, MS EXCEL and Mcrit AON assignment routines
Statistical software	MS EXCEL
Database software	DBF/Clipper, MS ACCESS, Bridges/NIS
GIS software	Bridges/NIS
Hardware	PC Intel Pentium III,450Mhz, 256Mb RAM (minimum)
Expected Running time	15 minutes for Generation/Distribution 120 minutes for Assignment-Modal Split (39.060 OD flows per 3 values of times segments, so 117.180 pairs of OD flows are assigned). 9.000 OD pairs (which represent 80% of total trips) can be assigned in 12 minutes.
Usability	Generation/Distribution are carried out in MS EXCEL & MS ACCESS (supported by Visual Basic) with a user-friendly interface. Assignment is an straightforward process using Bridges/NIS assignment routines

6.1.2 Adaptation of KTEN for freight transport

In the context of the spatial planning issues covered by the ESPON program, a transport model should allow the prediction of future flows in order to identify potential bottlenecks. The impact of such bottlenecks in important transport corridors can be very important in terms of economic development, accessibility but also in terms of pollution. However, a model which only covers passenger transport misses the majority of flows, i.e. freight transports. In this section we, therefore, propose a methodology for including freight into the existing KTEN framework.

A first aggregated model will be developed combing all types of products, based on data which is already available. Depending on the results, and the availability of data from large EU transport models (specially EXPEDITE and DESTIN) more desegregated models will be programmed to refine forecasts per groups of products and logistic chains; freight services provided by freight carriers will be surveyed and introduced in the model in the last phase of the work. Next, the first phase of the work (aggregated model) is described:

Freight generation and attraction: Generation and attraction will be calculated depending on relevant variables such as the GDP and the population of each NUTS, the transport cost to get from the origin to the destination, and the insularity of both origin and destination. Discrimination between type of products will be studied afterwards in function of data availability.

Calibration: The model will be calibrated using real data from Eurostat of tonnes of freight between all EU countries through time series starting in 1990.

Freight modal split: Modal split of freight transport will be calculated using an exponential function depending on the distance between the origin and the destination, the cost in the transport networks arcs and the cost of the transport terminals.

Assignment: Assignment on a transport multimodal network (each matrix of each mode will be assigned on the respective transport network), using shortest paths in time and/or cost, with no capacity restrains.

6.2 MASST model

6.2.1 Introduction

The Macroeconomic, Sectoral, Social and Territorial (MASST) model is a model for the interpretation and subsequent simulation and forecast of territorial trends in terms of economic growth. The present section presents its conceptual underpinnings, the methodology and the necessary data.

Our intent is to create a scenario methodology with the following characteristics:

- a comprehensive methodology, taking into account all territorial, social, and economic aspects that can be influenced by large institutional changes;
- a quali-quantitative methodology, aiming to measure quantitatively the impact of macroeconomic variables on territorial trends on the basis of conditional (qualitative) hypotheses;
- a transferable methodology, since it can be applied at different spatial levels of analysis - national, regional, local. With this characteristic, if data at a high disaggregated territorial level are not available at present, the methodology can be replicated in the future when data are made available.

The methodology is based on the general idea that territorial trends in the future will be radically influenced by the change of some crucial elements, namely:

1. the new institutional settings of the enlarged Europe;
2. the institutional decisions concerning new transport infrastructure that will be developed in the near future;
3. macroeconomic trends that will take place in the near future, as the result of global economic trends (exchange rate euro/dollar, or euro/yen; unemployment levels);
4. the macroeconomic policies that will be decided by both the European Central Bank (interest rates) and by single National Countries (fiscal policies).

Scenarios will be built on some conditional (quali-quantitative) hypotheses on the trends that the macroeconomic and institutional elements mentioned above will follow. They will generate different territorial settings of the new Europe; each future territorial setting will define winners and losers, and will identify new levels of regional disparities.

6.2.2 Conceptual Framework of the MASST Model

The MASST model finds its theoretical roots in the theory of custom unions and the theory of regional development. The enlargement of markets which follows the destruction of custom barriers will probably increase regional disparities, since:

- the positive effects of the large European single market will mostly benefit areas endowed with local resources, such as entrepreneurship, human capital, fixed social capital, able to attract new businesses, the countries having a high level of accessibility to the central European markets;

- within countries, the positive effects are of benefit to the most advanced competitive regions, able to tackle the growing competition deriving from the single market. In the Eastern European countries, regions do not have the same possibilities of development; the regions that probably will succeed are the ones endowed with human capital, fixed social capital (regions with big urban areas, as the capital cities), and closest to the European Union;

- regional disparities in Europe worsened, in particular in the first years of the integration process, when the eastern European countries were starting the process of transition to the market economy;

- the 'J effect' of the integration process on the regional development has been frequently recalled in order to describe the temporal trend of the effects of the integration: in the initial years a sharp worsening of the eastern economies was registered, followed by some years of partial recovery.

The territorial trends that will come out of the European enlargement will therefore be of a worsening of regional disparities, all other things being equal. The idea, however, is that other things do not remain equal, since we will get:

- infrastructure policies that will enhance infrastructure endowment;

- European macro economic policies, as the result of the world economy trend (de or revaluation of exchange rates; interest rates);

- national macroeconomic policies in favour of employment creation.

The decision on one policy or the other changes future territorial trends, in terms of regional growth and regional disparities. The MASST model allows to interpret present territorial trends, by emphasising the role played by critical elements (like infrastructure, exchange rates, rates of interests, unemployment, human capital, social capital etc.) on regional growth. On the basis of the sets of relationships envisaged between these elements and local growth, simulation and forecasts on future territorial trends will be elaborated, on the basis of conditional hypotheses on macroeconomic trends.

Different scenarios of territorial trends will be provided; for each of them their efficiency, in terms of regional growth potentials, and cohesion, in terms of regional divergence, will be measured.

According to regional growth theory, territorial growth stems from two main elements:

- short-term elements which act on current economic situation, by enhancing growth through the increase in the demand for local goods;

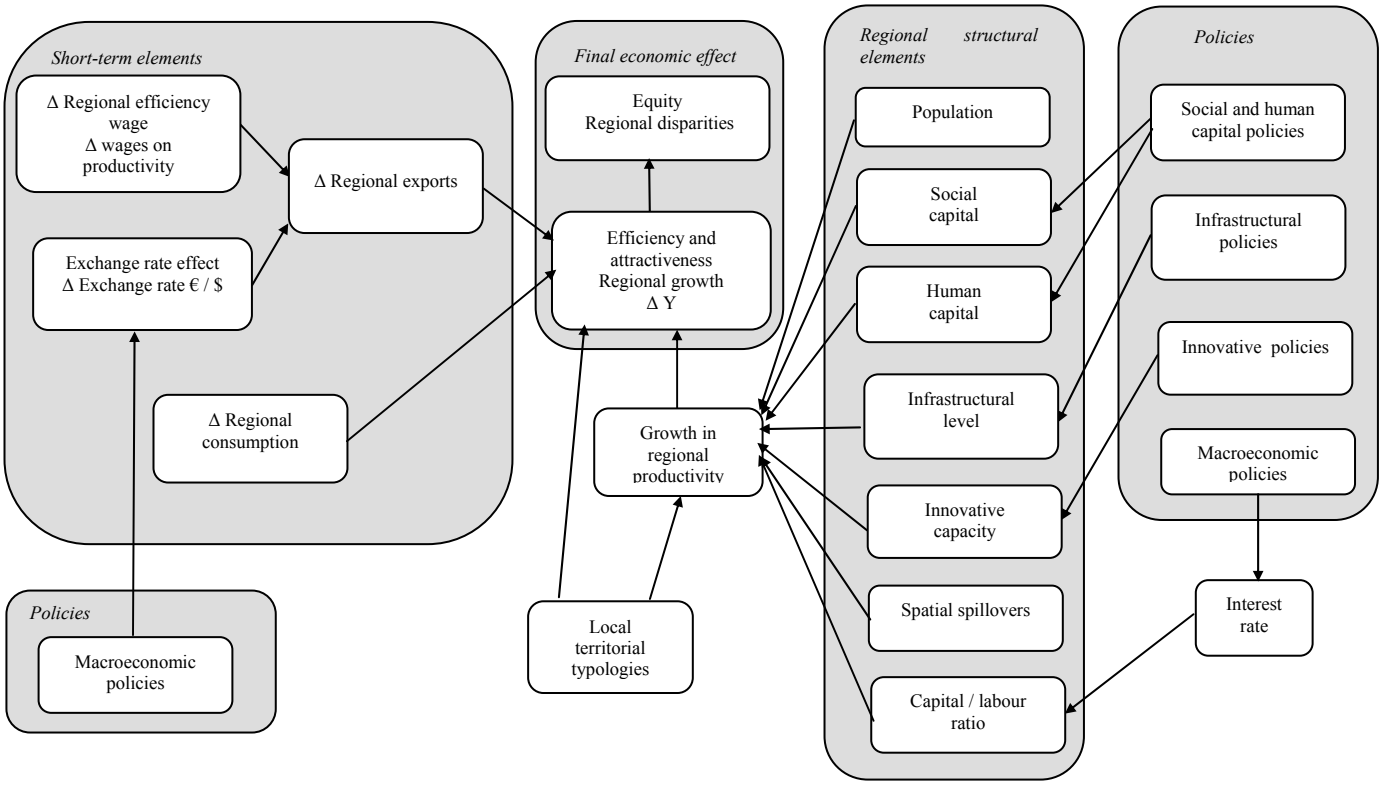
- long-term structural elements which act on the competitiveness of the local economic system, like innovativeness, infrastructure endowment, human and social capital.

The different trends of growth will be simulated on the basis of conditional hypotheses on macroeconomic trends (spontaneous and obtained through normative interventions); for each territorial trend, the final local growth will be measured, as well as the divergence / convergence trends.

If data are available, we would like to use the MASST model to measure both short and long term sources of growth. The conceptual framework of the MASST model is presented in Fig. 1.

Short-term elements that affect regional growth are summarised in the level of consumption of internal goods. The export capacity of a region, on its turn, depends on the competitiveness of internally produced goods on the external market; competitiveness of goods is influenced by the level of internal prices, which in turn, stems from efficiency wages, and from exchange rates. Internal consumption increases income, through a typical Keynesian multiplicative effect.

Figure 6. Logical Framework of the Macroeconomic, Sectoral, Social and Territorial (MASST) Model.



Regional economic theory has since a long time underlined the strategic long term, structural elements acting on competitiveness, by stressing, among others, the role of:

Infrastructure endowment, as a necessary, although not sufficient, condition for development. Infrastructure is expected to play a strategic role on regional competitiveness, by enhancing local attractiveness and therefore new investments and new business activities in an area. Moreover, for what concerns only transport and telecommunications networks, they are generally interpreted as strategic instruments for peripheral areas to increase accessibility to core market area, and therefore to enhance local competitiveness;

Human capital endowment. The increase in the quality of human capital, through local processes of learning, are emphasised as important elements in (endogenous) economic growth theories;

Social capital endowment. The most recent theories on local development emphasise the role of the increasing importance of knowledge factors, of non-material elements linked to culture, taste and creativity in present economic processes and the characteristics of what could be called the production function of these elements and the ways of their accumulation. In fact, these non-material elements develop through slow learning processes, fed with information, interaction, long term investments in research and education. Like all learning processes, they are inherently localised and cumulative, as they are embedded in human capital, interpersonal networks, specialised and highly skilled local labour markets and local innovative milieux;

The innovative capacity. Since Solow's theory of growth, technical progress is interpreted as the motor of economic growth. More recently the question addressed is the way in which the innovative capacity is endogenously enhanced, and not taken for granted;

Demographic trends. In the long run, population migration is expected to have a positive effect in the neoclassical approach to regional growth, since it readjusts disequilibrium conditions (and therefore conditions of limited growth and inefficiency) in the local labour market;

Capital/labour ratio in different sectors; the efficiency with which capital is employed in production processes acts on productivity and growth. Regions with a sectoral structure characterised by sectors with a low capital / labour ratio are expected to have greater possibilities of growth. Capital / labour ratio can also be influenced by macroeconomic policies through interest rates.

A database with this information will be built at NUTS2 and, when possible, NUTS3 level. Dummy variables representing territorial characteristics from the functional point of view will be inserted in order to avoid comparison on the basis of administrative data, and therefore comparison among areas which are rather different from the functional point of view.

Changes in the short as well as the long-terms elements can be the result of spontaneous economic trends or influenced by normative intervention policies. These possibilities will be taken into consideration in the conditional hypotheses that will be made.

6.2.3 Methodology for the MASST Model

The MASST model is a quasi production function, which allows measuring the role of all elements influencing productivity and growth on regional performance. As mentioned before, this methodology can be used either for national, regional or subregional analyses.

Our aim is to assess the impact of macroeconomic trends on efficiency and cohesion. As a measure of efficiency, we use the regional income level and income growth: by measuring the impact of different territorial trends on regional income growth, we can assess the divergent or convergent trends, and therefore cohesion trends.

The methodology estimates the following quasi production function:

$$\Delta Y_{rt} = f(e_{rt-1}, (w/\pi)_{rt-1}, I_{rt-1}, (K/L)_{rt-1}, H_{rt-1}, \Delta P_{rt-1}, Inn_{rt-1}, D) \qquad (1)$$

where r identifies the region, and t the time. Equation (1) summarises the conceptual framework presented in Fig. 1: regional income growth (Yrt) depends on both the short-term and the long term structural elements presented in sec. 2. In particular, it depends on:

• the exchange rate of euro (or of the local currency, before euro's introduction) with respect to $ (e); the level of efficiency wages (w/π), where w stands for labour cost, and π for labour productivity;

• the infrastructure endowment (I);

• the ration between capital and labour (K/L);

• the human capital (H); population migration (?P);

• the innovative capacity (Inn);

Equation (1) also contains the territorial typology variables (D) that help capturing territorial aspects (morphological, but especially functional territorial aspects - urban vs. agricultural areas). These territorial variables are fundamental in overcoming the biases related to the use of administrative rather than functional areas, since they allow to run cross-sectional analyses taking functional characteristics into account, without losing the possibilities to exploit administrative data. We will work with the following typologies

• central vs peripheral areas;

• border vs coastal areas;

• lagging vs non lagging areas;

• settlement structures;

• urban vs rural areas;

• polycentricity

Other typologies will be taken into consideration if required for the sake of coherence with the other partners in the project and by specific aims that can be addressed at a later stage.

By comparing the new levels of regional income to the old ones, or the differences in regional income growth, assessment on divergence / convergence trends is made possible. Cohesion trends we will be assessed on the basis of different methodologies.

We can measure regional disparities through descriptive methodologies, like Gini's concentration index(R):

(2) $$R = 1 - \frac{2}{n-1}\sum_{i=1}^{n-1} Q_i$$ with i = (1,n)

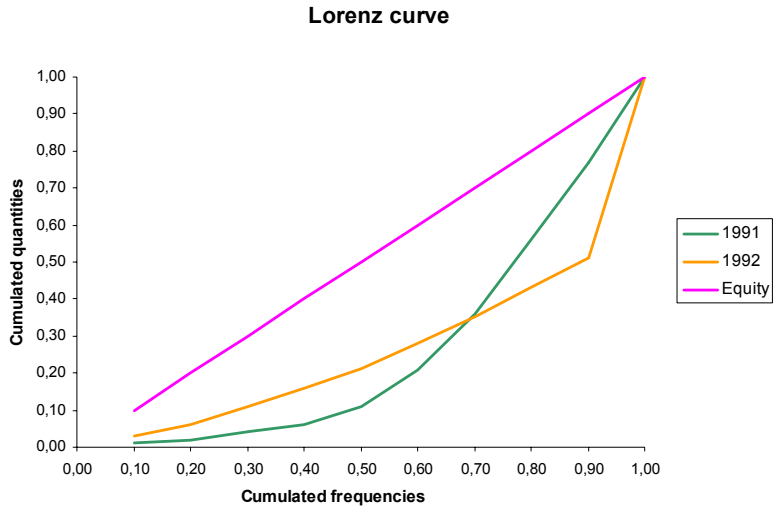
where n = number of cases

(3) $$Q_i = \frac{\sum_{j=1}^{i} x_j}{T}$$ with j = (1,i)

(4) $$Q_i = \frac{\sum_{j=1}^{i} x_j}{T}$$ total intensity with j = (1,n)

In this case, x identifies regional income. A higher R coefficient means a more uneven distribution of regional income, i.e. higher regional disparities. If R=0, then each region has the same income level, and there are no regional disparities. A graphic representation of the change in regional disparities can be made through the Lorenz curve (Fig. 1); the more the curve is similar to the 45° curve, the lower regional disparities are.

Figure 7. Example Lorenz Curve.



More sophisticated non-parametric analyses on regional disparities will be developed. Obviously, the European Territorial Cohesion Index developed in the next section will also be used.

6.2.4 Data and Indicators for the MASST Model

In this part of the report we suggest a list of existing and desirable indicators necessary for MASST model estimations. The indicators we suggest exist at a national level (NUTS-0): some of them are difficult to be obtained at NUTS-2. An effort to collect these data at NUTS-3 level is highly desirable, but at the moment quite difficult to put in place.

The list of necessary data for the MASST model is presented hereafter, divided between available (already existing) and missing data. Desirable indicators represent a list of variables which would be extremely interesting to have.

Table 6. Indicators.

Available

Indicator	Time series	Geographical coverage	Geographical disaggregation	Variables	Source	Availability
K - Fixed capital	95-00 + 75-97 95-00	EU15 CEEC	Nuts2	Mil. €, 15 sectors (some nations missing)	Regio E2gfcf95, e2gfcf79, xe2gfcf	Yes
W - Wages	95-00 + 75-97 95-00	EU15 CEEC	Nuts2	Mil €, 15 sectors	Regio E2rem95, e2rem79, xe2rem	Yes
P - Population	1970-1999 1995-2000	EU 15 CEEC	Nuts2	Thousands people	Regio d2age80 xdage90	Yes
Y - GDP	1995-2000 1995-2000 1977-1996	EU 15 CEEC EU 15	Nuts2	Millions €, pps, total	Regio E2gdp95, xegdp E2gdp79	Yes
Y - Value added	1995-2000 1995-2000 1977-1996	EU 15 CEEC EU 15	Nuts2	At basic prices; Millions €, 15 sectors Factor cost/mkt price	Regio E2vabp95, xe2vabp E2vafc/mp79	Yes
L - Employment	1995-2000 1995-2000 1977-1996	EU 15 CEEC EU 15	Nuts2	Thousands employees, 15 sectors	Regio E2empl95, xe2empl, e2empl79, lf2emp	Yes
Inv - Investments	1995-2000 (missing)	EU 15 + CEEC	Nuts2	Inv. in tangible goods	Regio S2_sbs, x_sbs	Yes
Inn - Innovative capacity - Patents total high tech - R&D expenditure - R&D personnel - Human resources HT - Sectorial empl. HT	 1989-2000 1989-2000 80-02 / 95-00 85-00 / 95-00 94/01 94/01	 EU 15 + NO EU 15 + NO EU 15 / CEEC EU 15 / CEEC EU 15 EU 15	Nuts2	 8 sectors 1 sector 4 sect., €, pps, %gdp; 4 sectors 7 sec., diff resources 7 sectors	Regio pat123 patht123 exp2, xrdexp pers2, xrdpers eht_r ehtrd_r	Yes
I - Infrastructural level a) Data b) indicator: accessib. potential	78-00 / 95-00	EU 15 / CEEC	Nuts2	Road, rail, sea networks; air, sea passengers, freight	Regio t2air_f, t2air_p, t2net, t2sea_f, t2sea_p, t2seaf99, t2secu, t2truck, t2veh, xtair_f, xtair_p, xtnet, xtsea_f, xtsea_p, xtsecu, xtveh SASI - Espon 2.1.1	Yes
H - Human Capital - female activity rate - number of doctors - unemployment	1995-2000	EU 15 + CEEC	Nuts2		Regio Lf2actrt H2pers Un2ltu, xunltu, un3pers, xunpers	Yes
D - Territorial typologies - central vs periph. - border vs coastal - lagging vs non lag. - Settlement str. - Urban vs rural - Other typologies?	1 year	EU 15	Nuts2		Db Espon	Yes

Missing

Indicator	Time series	Geographical coverage	Geographical disaggregation	Variables	Source	Availability
C - Consumption		EU 15 + CEEC	Nuts2		?	No
E - Exports		EU 15 + CEEC	Nuts2		?	No
e - Exchange rate (€ or ECU/$ and National Currencies/$)		EU 15 + CEEC	Nuts0		?	No
IR - Interest rate		EU 15 + CEEC	Nuts0		?	No
SC - Social Capital (Local networks) - local joint ventures - local turnover in labour market - linkages with local promoting agencies		EU 15 + CEEC	Nuts2		?	No
LN - Long-distance networks - joint ventures - turnover in labour market - promoting agencies - town twinning		EU 15 + CEEC	Nuts2		? Ask BBR-P. Schön	No

Desirable indicators

Indicator	Time series	Geographical coverage	Geographical disaggregation	Variables	Source	Availability
Inn - Innovative capacity (other variables) - new firms - apprenticeship		EU 15 + CEEC	Nuts2		?	No
H - Human capital - entrepreneurs - graduates - secondary school pupils		EU 15 + CEEC	Nuts2		?	No

Next steps and Timetable

The work of the group until March 2005 can be divided into three periods which correspond to three defined steps of the work:

- ***April - September 2004****: In this period the database will be built, all indicators defined, period of analysis identified on the basis of the available data.*
- ***November - December 2004****: In this period the estimate of the MASST model will be run, overcoming all technical and econometric problems that can arise. At the end of 2004 the first consistent estimates will be achieved.*
- ***January - March 2005****: Final estimates will be obtained on the basis of which some conditional hypotheses will be drawn.*

6.3 European Territorial Cohesion Index

'With this, at long last, we come to the final service that science as such can render to the aim of clarity, and at the same time we come to the limits of science. Besides we can and we should state: In terms of its meaning, such and such a practical stand can be derived with inner consistency, and hence integrity, from this or that ultimate value position. Perhaps it can only be derived from one such fundamental position, or maybe from several, but it cannot be derived from these or those other positions. Figuratively speaking, you serve this god and you offend the other god when you decide to adhere to this position […]. Thus, if we are competent in our pursuit (which must be presupposed here) we can force the individual, or at least we can

help him, to give himself an account of the ultimate meaning of his own conduct.' Max Weber, *Science as a vocation,* 1919

The quotation of Max Weber presented above intends to make it very clear that, whatever the work carried out by scientists in the ESPON 3.2 TPG, the final decision concerning the possible construction of a European Territorial Cohesion Index (ETCI) should be, must be and will be a political decision. What can be achieved within the framework of ESPON 3.2 is:

- A summary of the existing literature on synthetic indices.
- The transposition of previously developed methods to the ETCI purpose.
- The comparison of various possible solutions applied on the same datasets.
- The research of new statistical measures adapted to political requests.
- Determining the meaning and consequences of policymakers' choosing one particular index over another.

The strategy we propose to follow is based on a systematic confrontation between (A) theoretical concepts, (B) methodological tools and (C) empirical applications. Whatever the starting point, we will always necessarily combine the theoretical, methodological and empirical dimensions. Different strategies are possible, according to the starting point:

- The deductive strategy (A-B-C or A-C-B) is typically illustrated by Human Development Indices (HDI) which start from general principles (Universal Declaration of Human Rights) before establishing indices applied to all states of the world. We can imagine transposing such a strategy for ETCI through the transformation into statistical indices of general principles involved in the ESDP, the European Constitution or the Lisbon Strategy.
- The inductive strategy (C-B-A or C-A-B) is given by the bibliography on Sustainable Development Indices (SDI, generally starting from available databases in order to elaborate, step by step, more synthetic indices and indices which are finally used to propose an inductive definition to the concept of sustainability. We can think of transposing this approach into ESPON by trying to summarise the various indicators elaborated by TPGs.
- The innovative strategy (B-C-A or B-A-C) is rather a specificity of the ESPON programme which has tried to apply innovative scientific tools to empirical data in order to propose new concepts to policy makers. For example, the method of multiscalar territorial analysis was proposed in the working group I.4 (Spatial Integration) of the SPESP and generalised by ESPON 3.1 with the construction of the Hyperatlas.

6.3.1 The roots of the ETCI

In the first draft of the European Constitution (early 2004), the expression 'territorial cohesion' appears several times but remains vague. As it is most often associated with 'economic and social cohesion', the reader cannot easily infer what precisely is 'territorial'. The ETCI background turns to a lot of other sources, political (the Spring reports) as well as conceptual / statistical (the work done so far in ESPON).

From political requests to the creation of indicators

During the Lisbon summit in March 2000, the Commission was asked by the European Council to deliver a synthetic annual report in order to evaluate the progress in the achievement of the Lisbon objectives. This evaluation goes through some indicators, called 'Structural Indicators' by Eurostat. Since then, each year in February or April, the Commission publishes the Spring reports. These reports combine indicators in a large

variety of fields. For example, in the first Spring report (March 2001), 35 indicators have been proposed, covering 5 themes: general economic background, research and development, employment, economic reform and social cohesion. This first list has been amended afterwards: some environmental indicators have been added, other employment indicators have been selected, etc. The ETCI elaboration will take into account some of these indicators. To some extent, as these indicators represent an analytical view, the ETCI will provide a synthetic perception by the choice and combination of the most relevant sides.

The ETCI task is also related with the work of other institutions in the field of indicators, especially the Joint Research Centre (JRC), the European Environment Agency (EEA), Eurostat and the OECD. The Joint Research Centre (JRC) is working on composite indices, with the constant aim of linking the indices with policy recommendations. Their contribution is either didactic (reviewing the existing composite indicators, providing advice in data normalisation or data weighting, etc.) or methodological (proposing indices such as the Policy performance index (PPI)). The European Environment Agency has also made some attempts at aggregating environmental indicators. Special attention will be paid to the respective methodologies and to the results.

In a larger spectrum than the European territory, the OECD also gives insights on the topic of territorial indicators. A work on comparable data has been undertaken on 4 themes at the subnational level: economic (structures and performance), social (well-being and cohesion), demographic (patterns and migration) and environmental (quality and amenity) (OECD 2002). Although no attempts have been made to synthesize all the variables into a single indicator, the results are interesting in the ETCI perspective because they address the issue of territorial disparities within countries, which are at the heart of the concept of territorial cohesion.

First steps towards the review of bibliography

The work done so far consisted in identifying the main sources and establishing the bases of the work.
The first reference in the field of aggregated indicators is the Human Development Index (HDI), created by the United Nations in 1991. Its purpose is to measure human development through other means than GDP/inh, so as to focus more on the persons and on human well-being. The classic HDI combines three dimensions of development: economy, education and demography (life expectancy). It allows a ranking of the world countries following their degree of achievement in human development. Each year a 'Human Development Report' is published. The HDI has led to an increasing scientific literature, in the fields of statistics, economy and regional science. There are tens of reviews and hundreds of articles addressing the topic of building / criticizing the index, selecting the variables, aggregating / disaggregating, etc. An important part of constructing an ETCI is the review of the literature, in order to have the state of the art on how to select and combine the indicators. A good starting point is to begin with the existing reviews of literature (e.g. De Vires 2001). Some journals will deserve particular focus, like *Social Indicators Research, Review of development economics, Journal of development economics,* or *Sustainable development*.

In parallel with the HDI and partly in opposition to it, a new kind of aggregated indices has emerged: the Sustainable Development Indices (SDI). It is likely that the HDI and the SDI represent the two main families of indicators, in their purpose and in their methods: according to Morse (2004), the HDI would be top-down and the SDI bottom-up directed.

ESPON and territorial cohesion

The ETCI task can rely on several achievements within the ESPON framework concerning the concept of territorial cohesion and the ways to measure it. Those works can be considered as foundation stones on which the ETCI is built.

The first attempts were made during the preparation of ESPON, i.e. in the SPESP. The SPESP strand 1.3, 'indicators for social integration and exclusion', produced a first list of indicators to measure social integration. The strand 1.4, 'spatial integration', gave some insights into the issue of spatial integration: the authors underline the various facets of the concept which can be related to 'mechanic integration' (similarity, homogeneity, discontinuities) and 'organic integration' (flow, accessibility, barriers). It was also underlined

by the SPESP that it is dangerous to separate the analysis of social and spatial integration which are both parts of the more general concept of territorial cohesion.

The ESPON project 3.1 has summarised the previous terminological and methodological work and has gone one step further for making the concept operational through the so-called Hypercube. At a first level, this Hypercube distinguishes four fundamental dimensions: cohesion, territory, scale and time. At a second level, each dimension comes in different elements: the 'cohesion' is composed of potential, position and integration; the 'territory' of society and space; the scale from various levels from World to local; the time from short term to long term. The Hypercube is a very useful concept, not only to define territorial cohesion but also to link the concept with its policy implications.
The work on indicators developed in the ESPON framework will also be taken into account, namely the selection of 'core indicators' by the TPG 3.1 on the basis of indicators provided by all the TPGs (cf. Matera Guidance Paper).

6.3.2 Methodology for the definition of an ETCI

Literature review

The review of the literature will not be an abstract exercise but will be systematically connected to the operational questions of the building of an ETCI.

'Spiritual exercises' on a reference database

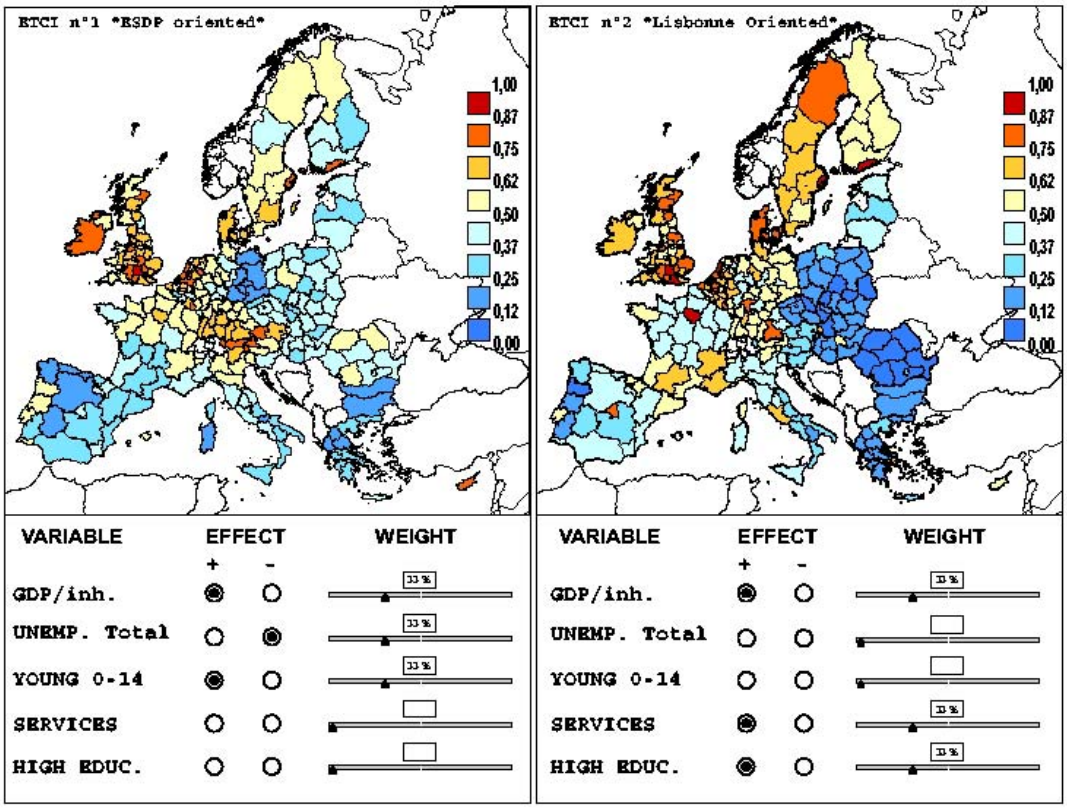
To evaluate the advantages and inconvenients of the various concepts or methods which have been proposed for the elaboration of composite indices, we suggest to use one or two reference databases which will be the basis for the systematic comparison of methodologies. Those reference databases will be made available for all ESPON users and the experiments will also be stored with complete results and programmes used. Systematically using the same database for those experiments will produce added value and make the comparison of alternative solutions easier. We propose to use the 'Statistical annex of the 2nd Cohesion Report' as our first reference database for those experiments.I It is a database which has already been analysed in depth by many people and which is sufficiently old (1999) to avoid the political problems which would necessarily appear if we were working on up-to-date databases, since it cannot be used for immediate actions (reform of Structural Funds).

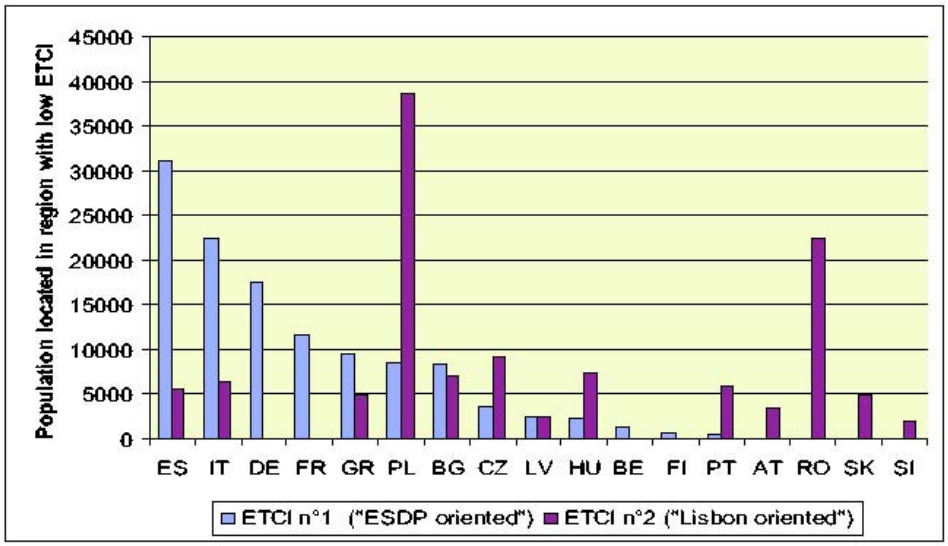
The Statistical Dimension

From a statistical point of view, the elaboration of an ETCI is a classic question of data reduction for which many solutions are proposed in the field of descriptive statistics. It is also a problem of data transformation because the policy maker will expect certain properties from the final index. And we should not forget that there is also a problem of data interpretation because the results should be easy to use and operational. Nevertheless, we have to bear in mind that data reduction is necessarily connected with possible data manipulation and that a good statistician can easily orient the results in one or another direction.

As we are aware that an ETCI could be used in the future for the allocation of Structural Funds, we have to make it very clear how it is built and how it could be oriented by policy-makers in one or another direction. If necessary, we can build an 'ETCI Computation Machine' in which policy makers can change the sign and the weight of the variables introduced in the computation of the final results and immediately receive the resulting map with the amount of population or region eligible to Structural Funds in each state. As a pedagogical example of data manipulation, we have applied a methodology derived from the UN's HDI to the data of the 2nd Cohesion Report in order to obtain two different ETCI formulas, derived from two European political documents: ESDP and Lisbon (See Figure 8 and Annex II).

Figure 8. The Statistical Dimension of the research on ETCI.





source : Data : Statistical annex of the 2nd Cohesion Report ; Map : Eurogeographics
(c) Grasland C., Hamez G., 2004, ESPON 3.2 - UMS RIATE

The Spatial Dimension

As our purpose is related to the construction of a European Territorial Cohesion Index, we should not only focus on the statistical dimension but also introduce important considerations of spatial analysis. This is probably the most innovative part of the work to be done by ESPON as compared to other institutions like the OECD or the UN, which have a good experience in statistical methods but very little interest in the introduction of a spatial dimension in the measure of cohesion or development.

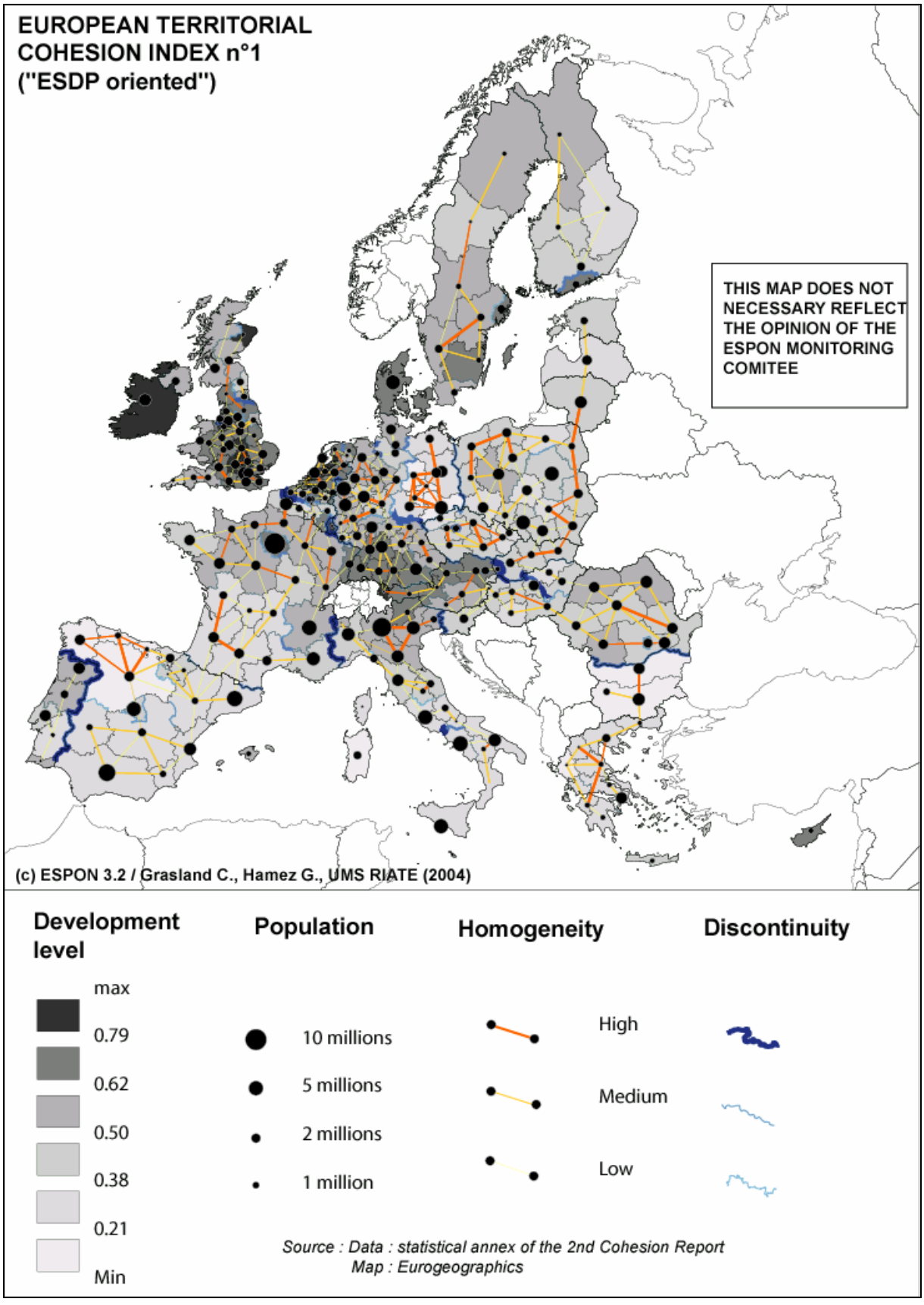
One of the most important aspects of territorial cohesion is related to the spatial organisation of heterogeneity. The global level of heterogeneity (e.g. mean difference of development between two regions), has to be compared to the local level of heterogeneity (e.g. mean difference between contiguous regions) in order to propose a measure of spatial autocorrelation, generally positive, which indicates that differences are lower between nearby regions than between distant regions. The evolution of spatial autocorrelation is a precious measure of the phenomena of local convergences between regions of different levels. It is also possible to measure territorial autocorrelation based on the comparison of heterogeneity between regions of the same category and regions of different categories. Such measures are very helpful when one suspects the existence of 'paths of convergence' or 'paths of development' which are not necessarily related to groups of neighbouring regions but to groups of regions of the same type (polycentric, industrial, metropolitan, peripheral,?).

The cartography of heterogeneity is a very useful tool for the development of a policy of territorial cohesion. In previous research of the SPESP and the ESPON programme, many proposals have been made for the cartography of discontinuities related to one single variable like absolute or relative difference in GDP/inh. But a territorial discontinuity can generally not be based on a single criterion and should be based on several criteria. Therefore, we propose to develop a multivariate analysis of territorial discontinuities which will examine each elementary discontinuity for all criteria before combining them together in global discontinuities which will have a qualitative and quantitative dimension[1].

As an example, Figure 9 presents the values of discontinuities for our ETCI n°1 which is a combination of economic (GDP/inh.), social (total unemployment rate) and demographic discontinuities (% of young). Each criterion contributes equally to the global value of discontinuity which can be the result of very different combinations. The homogeneous areas are easy to visualize (orange and yellow links between regions with low differences on all criteria) and are separated by territorial discontinuities (blue borders with a thickness proportional to the sum of absolute differences on each of the three criteria). The qualitative analysis can help define the potential effects of each important discontinuity according to the level and the direction of differences on each criterion.

[1] This means that the global discontinuity will not be based on the differences related to a global synthetic variable but will be based on a synthesis of all local discontinuities. This is very important if we want to avoid the phenomena of 'compensation' between criteria which could appear with the first solution.

Figure 9. The spatial dimension of the research on ETCI.



Timetable for ETCI

• May 2004 (Lillehammer - FIR)*: Presentation of assumptions and methods with illustrations. Agreement on the future development of the project.*
• May 2004 - May 2005*: Review of literature on composite indexes of development- Experiments on test database (2nd Cohesion Report). During this period, the review of literature and the experiments on database will be made available for all ESPON members (especially ECP, CU, MC) in order to obtain feed backs from scientific and political point of view.*
• May 2005 (SIR)*: Presentation of proposals for ETCI - Agreement of the Monitoring Committee. Taking into account the very particular nature of the problem, it is impossible to develop ETCI without a political agreement.*

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7 Scenarios

The main objective of the present project is the creation of different scenarios for the future development of the European territory. The process of scenario building consists of two parts, a scientific part and a political part. This part of the project thus demands a very close and informed relationship between the scientific TPG and the political decision-makers, i.e. the ESPON MC. Propositions of how to organise this relationship are advanced in section 8.1 ('Recommendations for a communication & consultation strategy throughout the project'). In this chapter, we will lay the foundation for this work by explaining the scenario approach we propose to pursue.

After a general introduction to the notion of scenario, we begin by an assessment of existing transnational scenarios, in order to see different approaches taken both in terms of content and form. This section also provides a series of examples of scenarios, thus allowing a more concrete view of the subject.

The second section will then propose a series of arguments concerning scenario approaches thus allowing a debate on which approach to chose. It looks at types of (theoretical) methods and (practical) techniques, explaining their advantages and disadvantages.

Scenarios an introduction

Scenarios are narrative descriptions of possible futures that focus attention on causal processes and decision points (Kahn 1967). Decision makers use them to evaluate what to do now, based on different possible developments. They describe a possible future through the development of a logical flow of 'cause and effect' steps toward the outcome. The term 'scenario' originated from theatre as an outline of the plot, sequencing the action in the order of its development. As applied to planning or policy, scenarios outline the future, based on some schematic descriptions of certain key variables. Scenarios can be developed through a variety of methods (see below), for instance by 'brainstorming' (relying in this case solely on expert opinion), or by use of a computer model showing how certain key variables might interact through time.

Scenarios are distinct from many other methods because they do not suggest a single future but several possible futures, depending on how strongly the variables are allowed to influence each other. Where the number of factors to be considered and the degree of uncertainty about the futures are high it is appropriate to build alternative images of the future that might be a useful hint to select the way forward. The scenario method also has the advantage of being multi-dimensional, since it allows for as many variables to be considered as desired. This method also avoids the problem of trying to specifically predict the future, since the method outlines several 'options' for the future. However, scenarios are still subject to the biases or idiosyncrasies of the experts used to brainstorm the future, as well as the limitations of any computer model used.

The formalization of the scenario method is attributed to the Manhattan Project around 1942 (Schoemaker, 1993). Dissemination of the technique became more widespread following use by the Rand Corporation in the 1960s (Kahn, 1965), and development by SRI and Royal Dutch/Shell Corporation in the early 1970s. Using the term scenario loosely, Van de Klundert (1995) suggests that the application of scenarios has evolved in ways that reflect the historical context of planning. Scenarios in the 1960s emphasized prediction based on existing stable trends, while those in the 1970s and 1980s accentuated coping with uncertainty. Scenarios in the 1980s and 1990s have emphasized public discussion and shared decision-making.

A number of sources provide excellent overviews of scenario approaches (Wack, 1985) and information about how to construct scenarios (Becker, 1983; Huss and Honton, 1987; Bunn and Salo, 1993; Schoemaker, 1993; Bossel, 1998; Fahey and Randall, 1998).

7.1 Assessment of existing scenarios

Scenario building is one of the most wide spread methods of long term planning and of the preparation of prognoses. The number of scenarios prepared in the course of different planning and research procedures is immense. During our work on the project ESPON 3.2, we could collect only a small fraction of these scenarios, and we could analyse properly only a fraction of the collected ones. Therefore, the aim of this description can be only to describe the basic types of scenarios prepared in the field of long term and territorial planning and to select one or two samples (in the Boxes) for their characterisation.

The list of scenarios found and surveyed in the first phase of the work was the following:

European scenarios:

• Scenarios Europe 2010. Five Possible Futures for Europe. European Commission. Forward Studies Unit Working Paper. Gilles Bertrand, Anna Michalski, Lucio R. Pench. July 1999.

• Europe plus thirty. Analysis and Prospective than and now. Lord Wayland Kennet and Dimitris Kyriakou. S.P.I. 98. 108. November 1997.

• Europe? Which Europe? Which future Europe? A collection of different views on the future of Europe. MCRIT, Barcelona web-page. revised December 2002.

• Four futures of Europe. Paul Tang and Ruud de Moij. Centraal Planbureau. Den Haag. CPB Report 2003/4.

• Europe 2000+. Cooperation for European territorial development. European Commission. Brussels 1994.

• Perspectives of Europe's role in the future. Finland Future Research Centre, Dr. Markku Wilenius. Research Director. FICOR. 2002.

• VISIONS. The European Scenarios. International Centre for Integrative Studies. The Netherlands. February 2001

• Europe Beyond the Millennium. Accenture. Vernon Ellis. London 2001.

• EU Regional Policy in the Enlarged Europe 2007-2013. In: Benchmarking regional policy in Europe. The University of Strathclyde in Glasgow. European Policies Research Centre. 2001

• Scenarios for EU Structural Actions. 2007-2013. Swedish Non-Paper submitted to the Italian presidency. November 2003.

• Options for spatially balanced developments in the enlargement of the European Union. ESPON 1.1.3. Second Interim Report. Part II.

Transnational scenarios and visions:

• VASAB: Vision and Strategies Around the Baltic Sea _ Towards a Framework for Spatial Development in the Baltic Sea Region. Karlskrona 1994.

• VISION PLANET. Strategies for Integrated Spatial Development of the Central European, Danubian and Adriatic Area. Background Report. April 2000

• NorVision. Spatial development perspective for the North Sea Region. July 200.

• ESTIA. Spatial Policy Integrated Framework of Southeast Europe. March 2000

• NWMA. North Western Metropolitan Area Spatial Development Vision. July 2000

• '5+5' L'ambition d'une association renforcée. Cercle des Economistes. (Scenario for the Cooperation of 5 northern and 5 southern Mediterranean Countries). www. lecercledeseconomistes.asso.fr/5+5.pdf

National spatial development perspectives and scenarios:

• Catalunya 2020. Visions sobre el future del territory. Gencat. www.catalunya2020.net

• SUOMI 2015. Finnish National Fund for Research and Development, Sitra, Helsinki 2000.

• The National Spatial Strategy of Ireland 2000-2002. www.irishspatialstrategy.com

• National Planning Framework of Scotland. Scottish Executive. Planning. www.scotland.gov.uk/planning/npf_home.asp

• Shaping our Future. Regional Development Strategy for Northern Ireland. 2025. www.drdni.gov.uk/shapingourfuture/regional_dev/htm

• Denmark 2020. Miljøministeriet. Spatial Planning in Denmark.

• Programme Territoires 2020 de Prospective 2000-2003. DATAR, 2000, Paris

• Pays et agglomérations, vers une recomposition du territoire. La Lettre, no. 172 supplément.

• A Region at Risk: New York-New-Jersey-Connecticut Metropolitan Area. Regional Plan Association. 1996 3rd review.

• Grand Design for the 21st Century. Japan. 5th Review. Japanese National Land Agency. 1998.

• Scenarios of the regional development in Hungary until 2010. Hungarian Academy of Sciences . 1996. In: Enyedi György: Regionális folyamatok Magyarországon (Regional processes in Hungary), Budapest 1996.

Sectoral scenarios:

• Replacement Migration: Is it a Solution to Declining and Ageing Populations? United Nations Population Division 2003.

• Europe's Changing Demography. Constraints and Bottlenecks. European Commission. Joint Research Centre. Demographic and Social Trends Issue Papers. EUR 18967EN June 1999.

• Mosaic Living. IPTS, Seville and Institute for Social and Economic Research, University of Essen. 1999

• Beyond the predictable. Demographic Changes in Europe up to the year 2050. EUROSTAT, Luxembourg. 1997/98.

• The Spatial Distribution of population in 35 World Cities. The Role of Market, Planning and Topography. Alain Bertaud, Stephen Malpezzi. The Center for Urban Land Economics Research. The University of Wisconsin. 1999.

• Global Environment Outlook 3. Nairobi 2002.

• OECD Environmental Outlook. Paris 2001.

• Scenarios for Society and Environment in 2020. Copenhagen Institute for Future Studies. www.mstdr/udgiv/publikationer/2001/87-7944-702-3/html

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• Impact of Technological and Structural Change on Employment. Prospective Analysis 2002. Background Report. European Commission. European Science and Technology Observatory Network. Report EUR20258.

• The Future of Manufacturing in Europe 2015-2020. The Challenge for Sustainability. IPTS Joint Research Centre. March 2003.

• European Energy and Transport. Trends to 2030. European Commission. Directorate general for Energy and Transport. National Technical University of Athens. January 2003.

• FANTASIE. Forecasting and Assessment of New Technologies and transport Systems and their Impacts on the Environment. www.etsu.com/fantasie/FinRep_exec.htm

• Freight Transport in Europe. Policy Issues and Future Scenarios on Trans-border Alpine Connections. Vrije Universiteit, Amsterdam. Faculteit der Economische Wetenschappen en Econometrie. January 2000.

Global scenarios:

• Millennium Development Goals. United Nations. New York 2003.: http://www.un.org/millenniumgoals/

• Global Scenarios for the 21st Century. California Institute of Technology. http://mars3.gps.caltech.edu/whichworld/explore/scenarios_top.htm

• Global Environmental trends, population and Human Well-being. World Resources Institute. www.wri.org

• The Changing Geopolitics of Energy. Part I. Key Global Trends in Supply and Demand 1990-2020. Center for Strategic and International Studies. Washington D.C. Anthony H. Cordesman. August 1998.

By defining scenarios, we have to distinguish, first, between trend predictions, scenarios and future visions. In the case of trend predictions, the emphasis is on the present structures and conditions and their observed directions of change. Future structures and conditions are more or less the results of the projections of the present trends of changes. Visions are the descriptions of desired or undesired future states of affairs, where the development path, leading from the present to these desired or undesired future conditions is not explicitly defined. Finally, under scenarios, we understand a type of future research where: the present state of a system and its environment; several alternative future states, and the courses of processes and events that may bring forth these alternative futures are defined and described.

Sometimes, of course, it is difficult to classify a specific scientific or political study or document according to this distinction, because its character is a mix of these different approaches. In these cases, the factor deciding whether the document should be included into our survey and analysis, was its relevance for European spatial planning.

We outline, as follows, the classification of existing scenarios according to some criteria and present some selected examples of them. The selection reflects again the relevance for the project ESPON 3.2.

7.1.1 The main policy alternatives of the scenarios

Though the scenarios are very different in form, methods and presentation, nevertheless, there are some principal policy axes, or alternatives, according to which they can be grouped and systematised.

1. **State vs. market.** One principal alternative is the role of the market and of the state in economic and social relationships. In one way or other, this alternative is emerging in almost all scenarios. There is

one alternative in most scenarios, where the market prevails over state control and regulation. More precisely, it is the big enterprises, which set the rules and government plays an inferior rule. Welfare policies would be strictly reduced and restricted, old age, social and health care would be marketised. This alternative would result in a higher rate of growth in term of products and income, but at a price of growing disparities, worse environmental and infrastructure conditions. The counterpart alternative is generally more state control, higher rate of centralisation of income in the government budget, and the maintenance of welfare systems, coupled with somewhat lower rate of growth and lower overall level of income but also smaller social and regional disparities. Of course, the trade-off between these alternatives is not the same in the different scenarios.

2. **Integration vs. disintegration.** These contrasting alternatives are formulated generally as results of the success or failure of some reform measures within the EU. Disintegration does not mean the dissolution of the EU, rather the forming of some county groups with different speed of reforms, different aims and different external orientation. In some scenarios not only member states, but regions choose their on way, they are relying more on regional and local markets and resources. EU level regulations and norms are decreasingly observed. Its counterpart is obviously the preservation of the unity and the strengthening of community level policies and institutions within the European Union[1].
3. **Globalisation vs. Fortress Europe.** In this case, the distinctive factor of the alternatives is Europe's position in the world. One of the alternatives represents an active role and openness towards the 'outside' world. The process of enlargement goes on and the EU establishes close cooperation with the European countries beyond the borders of the EU. The problems of the Trans-Atlantic relationship will be solved and Europe plays an active role towards the Third World. The counterpart scenario describes a development path, where the troubles of the outside world and the worry about preserving the 'European values' give rise to a more isolationist policy. External commitments would be reduced and 'worldwide action' would be given up over to other big powers in the world.
4. **Deepening vs. widening.** This alternative curiously does not appear among the scenarios explicitly. What does appear, they are different success and failure stories of enlargement, but with no relation to the success or failure of the 'deepening', of closer integration. It seems that the authors of the scenarios do not regard enlargement and the deepening of integration as mutually exclusive alternatives. The enlargement process, however, can have different outcomes in the scenarios. It can be full and successful; in other scenarios, the new member states cannot comply with EU regulations and cannot adapt themselves to the competitive situation. Simultaneously, present member states continue to maintain restrictions and derogations concerning the free movement of labour, of carriage and concerning the equal treatment in respect to agricultural and structural supports for a long period. In other scenarios, enlargement process would be suspended at half-way and several candidates would not become members within a foreseeable period of time.
5. **Knowledge based society and economy:** alternatives concerning this factor are not poles in diametrical opposition, rather variants with different emphases. There are quantitatively different scenarios, where smaller or larger shares of resources are devoted to research and development, implying either catching up or further falling behind the US and Japan. There are structurally different development paths, where the allocation pattern of the resources differ. In one alternative, resources are concentrated on the sectors where the general scientific and technological development is worldwide the most rapid (ICT, bio- and genetic industries, space research, etc.). In a second one, resources are mostly allocated to sectors, where Europe already has a competitive advantage (high quality more traditional engineering industries, fashion and luxury goods, high quality food, etc.). In a third one, financial resources of R&D are evenly (i.e. proportionally) distributed among sectors. Obviously, the alternatives result in different growth rate and competitiveness of the European economy.
6. Several of the European scenarios include some **exogenous factors**, which influence European development to a substantial extent. These exogenous factors are of different nature:

[1] Within the broad concept of strengthening integration there are obviously different views concerning the most important measures to achieve this objective. For the authors of Eastern European scenarios it is the abolishing of restrictive measures concerning the free movement of labour and the equal treatment of new members in every respect. For Western authors it is the harmonisation of macroeconomic policies, of taxation systems, external and security policies.

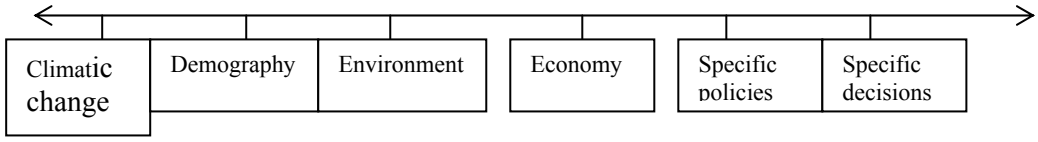
- **climatic and environmental changes**: cooling and floods in the North-West, warming and drought in the South-East of Europe, and as a consequence: large scale migration from the North to the South;
- no full-scale war, but **permanent small- and medium-scale armed conflicts beyond the Eastern and Southern external borders of the EU** and intensive EU involvement in 'peace-keeping' actions. Continuing terrorist attacks within Europe, which represent a permanent threat for European security.
- In some scenarios – especially in the extremely 'marketised' ones, where welfare systems are substantially reduced **– increasing social unrest**, frequent mass demonstrations within Europe, sometimes with violent outbreaks.

7. For the project ESPON 3.2 the most important aspect of the scenarios would be the **spatial aspect.** Unfortunately, there are rather few scenarios, where the spatial dimension is elaborated explicitly and sufficiently, though most scenarios have a distinct spatial impact and it is sometimes – in passing – mentioned in the descriptions. Where spatial impacts are dealt with explicitly in the scenarios, they are interpreted differently:
   - **The territorial approach**: In these scenarios, the impacts are interpreted in terms of urbanisation and urban concentration. The variants differ in respect to the success of the multipolar development efforts. To what extent it will succeed to develop other growth poles, and metropolitan centres of European or even global significance besides and beyond the 'Pentagon'? What will be the share and role of big, medium and small cities in urban development? What future trends can be expected in the development of the settlement network?
   - **The regional approach**: In these scenarios, the impacts are interpreted in terms of regional economic disparities. Will they increase or decrease in the future and what are the driving forces behind these developments. Which type of regions will continue to grow dynamically, which will catch up and which will fall behind?
   - A special aspect of the regional approach is the treatment of **the trade-off between national growth and regional disparities.** The alternatives are formulated around the question of whether national governments should pursue a policy prioritising national catching up and growth, favouring regions producing the largest increment of GDP and disregarding, for the time being, increasing internal regional disparities, or – on the contrary – their main concern should be the reduction of internal regional disparities, even at the price of a certain slackening of national growth.
   - **The rural aspect**: A special spatial aspect of scenarios is the impact of agricultural policies upon the territorial structure of agricultural production and rural economy. The question is, whether rural land use practices should split into two substantially different types, 'segregated' to different parts of Europe, or the mix of land uses should be preserved mostly according to the present pattern. In the first case, mass commodity producing agriculture should be concentrated in the most fertile parts of Europe, while in the other parts a low intensity, environment friendly agricultural activity – with afforestation and turfing – should be pursued. This policy would increasingly promote the competitiveness of European agriculture, but would have a negative impact, in the first mentioned areas on the rural environment, in the last mentioned areas on the economic and demographic carrying capacity of the respective areas. The second policy - sustaining the present mixed land use pattern – would restrict European agricultural competitiveness, but would preserve the texture of European rural landscapes.

7.1.2 Action perspective

Scenarios are very different in terms of the factors and actors regarded as endogenous, that is, which policy decisions and actions can be made within the context of the scenario, and which factors and actors are regarded as exogenous, the change and development of which is beyond the manoeuvring space of decision-making options included into the scenario. It is also important to analyze what is the relative importance of exogenous and endogenous factors in a specific scenario. These factors can be arranged along a line, the two ends of which represent the factors, which are regarded exogenous and endogenous in most scenarios, respectively. Obviously, what is exogenous in one scenario, can be endogenous in another. Furthermore,

both exogenous and endogenous factors (variables), and even their combination could represent the distinctive elements of individual variants of scenarios.



7.1.3 Time perspective

This classification refers not to the length of the time horizon of scenarios, rather to the role and priority of the two ends of the time horizon. According to this classification, prospective and pro-active scenarios can be distinguished. Prospective scenarios are mostly determined by the present conditions, constraints and situation. Prospective scenarios are characterised by high realism and high explanation capacity. Their variants rarely represent sharply contrasting ones or sharp turns in policies. Pro-active scenarios, in contrast, set goals for the future and then try to define development paths, the pursuing of which could enable the fulfilment of these goals. Alternatively, they describe the occurrence of some, very undesired future state of affairs and try to define development paths, the pursuing of which would enable to avoid this occurrence. Consequently, proactive scenarios are characterised, generally, by less realism, the possibility of their implementation is less convincing, but – anyway – they could have a stronger mobilisation effect.

Box 1. Example for a proactive scenario: UN Millennium Development Goals

Goal	Targets	Target year
Eradicate extreme poverty and hunger	Reduce by half the proportion of people living on less than half dollar a day Reduce by half the proportion of people, who suffer from hunger	2015
Achieve universal primary education	Ensure that all boys and girls complete a full course of primary schools	2015
Promote gender equality and empower women	Eliminate gender disparity in primary and secondary education	Preferably by 2005
Reduce child mortality	Reduce by two thirds the mortality of children under five	2015
Improve maternal health	Reduce by three quarters the maternal mortality rate	2015
Combat HIV/AIDS, malaria and other diseases	Halt and begin to reverse the spread of HIV/AIDS	2015
Ensure environmental sustainability	Reduce by half the proportion of people without sustainable access to safe drinking water Achieve significant improvement in lives of at least 100 million slum dwellers	2020
Develop a global partnership for development		

Source: http://www.un.org/millenniumgoals/

7.1.4 Scale and level of aggregation

Global and national scenarios were the prototypes of scenario building. Many of them were prepared already in the sixties (Limits to growth, Mankind at the turning point, Global 2000, and so on). European scenarios started somewhat later, but spread very rapidly. Scenarios prepared for regions are still relatively rare. There are however, several multilevel scenarios: Demographic and economic scenarios for Europe include frequently separate calculations for the major countries of Europe (UNPD: Replacement Migration: Germany, France, UK and Italy). Sometimes, the reason for building multilevel scenarios is that some parameters and data for lower levels are missing and they are substituted by parameters of higher-level territorial entities (Demographic scenarios of the project ESPON 1.1.3).

Box 2. Example for a sectoral scenario: United Nations Population Division: Replacement Migration: Is it a Solution to Declining and Ageing Populations? 2003.

Scenario 1 Assumptions: fertility levels will be below replacement until 2050, migration flows the same as between 1990-98.
Results: The population of Europe would be 101 million less in 2050 than in 2000. The reduction of the population of the European Union would be 44 million.

Scenario 2 Assumptions: the same fertility level, but no migration.
Results: The European Union would lose 62 million people between 2000 and 2050, and Europe would lose 123 million people.

Scenario 3 Assumptions: The size of the total population would be kept through replacement migration at the maximum level it would reach in the absence of migration.
Results: The total number of migrants needed to keep the total population constant at its maximum size until 2050, would be 47 million for the European Union and 100 million for Europe.

Scenario 4 Assumptions: The size of the population aged 15-64 would be kept at the maximum level it would reach in the absence of migration.
Results: The number of replacement migrants that would be needed to keep the population aged 15-64 constant is 80 million for the European Union and 161 million for Europe.

Scenario 5. Assumptions: The ratio of the population aged 15-64 years to the population aged 65 years or older (the potential support ratio) would be kept at its 1995 level (4,3 for the European Union and 4,8 for Europe)
Results: 700 million replacement migrants for the European Union and nearly 1,4 billion for Europe.

Source: http://www.un.org/esa/population/publications/migration/migration/htm

7.1.5 Scope of scenarios

One of the basic differentiating factors of scenarios is their scope: the number and diversity of sectors and factors included. Most of the scenarios are of limited scope: they are dealing exclusively with demographic, climatic or economic developments. The explanatory and convincing capacity of these scenarios is generally larger: their quantitative methods are better known and generally accepted. Nevertheless, the limited scope and the isolation from other processes in the economy, society and the environment could raise doubts about their reliability and reality. Sectoral scenarios, therefore, are used rather for technical purposes, to confirm or to reject a specific policy proposal or idea. Their contribution to a complex vision of the future is more restricted.
On the other hand, scenarios, encompassing a large and diverse range of sectors and factors describe a complex, vivid and realistic image of the future and the path leading to this particular future. However, with the growing number of sectors, actors and factors, included in the scenario building, the number of interactions and interrelationships between sectors and factors are growing at a highly increased rate. The definition and quantification of these interactions and interrelationships become more and more of speculative character and have an influence on the quality of the scenario.

Box 3. Example for a multi-sector, multi-factor, multi-actor scenario: VISIONS The European Scenarios. Prepared by the International Centres for Integrative Studies. The Netherlands, 2001

Name of the Scenario	**Knowledge is King**	**Convulsive Change**	**Big is Beautiful**
Main driver	Technology	Environment	Economy
Key developments	The acceleration of the information-age drives the formation of a global (connected) society and local (unconnected) society	The regional impacts of rapid climatic change (general warming: north hit by floods, south hit by droughts) disrupt society and change the European landscape	The forces of globalisation cause businesses to merge into a few clusters of multinationals, causing knock-on institutional changes and forcing ruptures in society.
Dominant sectors	Energy, transport	Energy, water	Infrastructure
actors	Business, NGOs	Governmental bodies, NGOs, Scientists	Governmental bodies, businesses
factors	Equity, employment, consumption behaviour	Consumption behaviour, Environmental degradation	Equity, economy
Dominant givens	Technology/innovation, ageing	Global Climate Change, migration	Globalisation/ liberalisation, role of EU
Information boxes	• 'Telematics' systems (electronically guided transportation) • Local regeneration schemes	• Fuel cell vehicle • Potential for renewable energy • European migration patterns	• Recent mergers • Multilateral Agreement on Investments
Bifurcations	• New technologies are used to centralise control • The social empowerment expected from establishing self sufficient communities never materialises	• Climate cooling occurs at a rapid rate in Europe • Carbon emission reduced through increasing nuclear capacity • Technology cannot solve environmental problems – it exacerbates them	• EU political fragmentation from which a power vacuum opens up • Businesses become socially responsible

VISIONS The European Scenarios. International Centre for Integrative Studies. The Netherlands

7.1.6 Quantification of scenarios

Prospective scenarios are generally quantified, pro-active scenarios to a lesser extent. A quantitative assessment is attractive at least for two reasons. First, it ensures, that the scenarios are consistent, since economic variables conform to identities, constraints and the current knowledge about interactions in the economy. Scenarios without computable models are frequently regarded as mere speculations. Second, the quantification gives a feel for the relative importance of various developments in the future. Obviously, there could be some developments and changes, which cannot be forecasted with any quantified model. In such cases, speculation could be in place. Nevertheless, quantification can have a control function even in those cases. Any speculation should comply with some basic quantitative rules and equations, and this compliance has to be checked before taking any scenario seriously. On the other hand, quantified scenarios are not in every case superior to non-quantified ones. The estimation of parameters and coefficients of complex and long-term forecasting models is frequently an adventurous and risky undertaking and even small mistakes can cause serious deviations.

Box 4. Example for a three-alternatives scenario: VISION PLANET INTERREG II C project for the CADSES region. Eastern enlargement and its spatial impacts on new member states. 1999.

	Scenario No. 1 'Euro-Realism' (continuation of existing trends)	Scenario No. 2 Dead-locking Integration (change for the worse)	Scenario No. 3 Intensifying Integration (change for the better)
Enlargement	It takes place, but with several provisional restrictions and derogations	It does not take place	It takes place with full and equal membership
Driving forces	Globalisation, transnational enterprises, traditional division of labour, based on cheap labour and other cheap production factors	Nationalistic and protectionist economic policy int he CEEC, based on 'social and environmental' dumping	Globalisation, combined with endogenous development and social and economic cohesion measures.
Regional disparities	Between Western and Eastern member state as a whole, decreasing Inside of Eastern member countries (between countries and regions) increasing, as a continuation of present trends	Between Western and Eastern Europe, as a whole, increasing. Inside Eastern Europe (between countries and regions) decreasing because of the slowing down of more developed countries and regions.	Between Western and Eastern member states, as a whole, decreasing. Inside of Eastern member countries disparities are decreasing because of the accelerated growth of less developed countries and regions
Priorities	Infrastructure, environment	Bailing out and subsidizing existing production structures	Restructuring production and infrastructure
Growth poles	Western border regions, capitals, gateway cities	There are none, or traditional industrial centres	Multipolar development, including smaller centres
Rural areas	Polarisation between industrialised agriculture and abandoned agricultural areas	Agriculture dominated by small farms, large rural population and low technical level	Agricultural area and rural population are decreasing, but at a more moderate and symmetrical rate
Environment	Significant further improvement mainly due to industrial and agricultural restructuring	No improvement, in some places even deterioration	Slower but stable improvement due to environmental measures

7.1.6 The number of scenario-alternatives

Scenario-building is generally interpreted as a plural expression: in the framework of scenario-building several alternative futures are drafted or computed. But it is not necessarily always the case. Even one single path of development can form a scenario, if it is implicitly contrasted with another path (e.g. the continuation of the present trends, or the business-as- usual development path). Examples for this are the Millennium Development Goals of the United Nations. Usually, however, more than one alternative development paths are elaborated.

The most frequently used number of scenario-variants – both at prospective and pro-active scenarios – is three: one pessimistic, one optimistic and a medium one, the last of them is generally regarded by the author(s) of the scenario, as the most probable to occur, or the most realistic to be achieved.

Four is also a frequent number of scenario-variants. They are applied especially, if there are two principal uncertain factors, which determine the development paths. In that case, the values of these two factors represent the axes of a system of co-ordinates. The combination of the two key uncertain factors yields four sectors of the system and four scenarios respectively.

Box 5. Example for a four-alternatives scenario: Four futures of Europe. Centraal Planbureau, Den Haag, 2003

Scenario	International Cooperation – National Sovereignty Axis	Public and Private Responsibilities Axis
Regional Communities	EU cannot adequately cope with Eastern enlargement and fails to reform institutions. A core of rich countries emerge and the World is fragmented in a number of trade blocks	Governments are unsuccessful in modernising welfare-state arrangements, vested interest blocks the reforms. Expanding public sector puts severe strain on European economies
Transatlantic Market	Focus on national interests, reforms of EU decision-making fail. EU redirects her attention to US. Welfare gains on both sides, but sharpening distinction between rich and developing countries	EU countries limit the role of state, rely more on market exchange. This boosts growth and increases inequality. But it remains difficult to dismantle the pay-as-you-go systems in continental Europe.
Global Economy	Countries broaden economic integration. Closer cooperation in non-trade areas is less feasible.	National institutions are increasingly based on private and market based solutions. Governments engage less in income distribution, so income inequality grows
Strong Europe	Reforms lay the foundation for a strong EU. Enlargement is a success. Europe is committed to broader international cooperation.	European countries maintain social cohesion through public institutions, accepting that this limits growth. But selective reform sin the labour market, social security and public production.

In the case of complex multi-factor, multi-actor, multi-sector pro-active scenarios, the number of alternatives rarely exceeds four, because it is rather difficult to produce a higher number of sharply contrasting, complex, consistent and still realistic European and World Visions. The number of variants could be increased, if some alternatives are subdivided into *sub-alternatives*, exposing minor differences.

The number of variants of sectoral scenarios of narrower scope is less limited. Especially, in the case of computer generated technical scenarios, the possible number of variants is unlimited and the distribution of their outcomes is worth to analyse. There is, however, a specific type of these quantitative scenarios, where specific additional measures are assigned to subsequent higher quantitative values of outcomes. One could call it the 'additionalist' approach.

Box 6. Example for an 'additionalist' scenario. Swedish paper on Expenditure Scenarios for EU Structural Actions. 2007-2013.

Possible Future Scenarios

4) 0,45% Scenario Total for 7 years **€358 billion** Percent of EU GNI **0,45%**
The total level of structural funds would reach 0,45% of EU GNI
Margin to 0,45% **€31 billion**
3) Least Resistance Total for 7 years **€327 billion** Percent of EU GNI **0,41%**
All present Obj. 1 regions keep present support, notwithstanding the 75% rule
3b) Objective 1 in EU15 except E, P, GR
€34,9 billion (present level)
3a) Objective 1 in E, P, and GR
€55 billion (present level)
2) Base Scenario Total for 7 years **€237 billion** Percent of EU GNI **0,30%**
The strict implementation of present Objective 1 regulation
2c) New Objective 2 in EU 15 except E, P,and GR
€43,6 billion (present Obj. 2 and Obj. 3 coverage)
2b) Phasing out Obj. 1 in EU15 except E, P and GR
€13,7 billion (€53 per capita/year)
2a) Objective 1 in EU15 except E, P and GR
€4,3 billion
National Approach Total for 7 years **€175 billion** Percent of EU GNI **0,22%**
Cohesion policy should reallocate funds between and not within member states. Poorer regions of richer states are not eligible
1c) Community Initiatives in EU27
€17,4 billion
1b) Obj. 1, new Obj. 2 and phasing out Obj. 1 in E, P and GR, Cohesion Fund in P and GR
€29,9 billion
1a) Objective 1, new Objective 2 and Cohesion Fund in the new member states
€127,6 billion (with 4% cap)

7.1.8 The regional and spatial dimension of scenarios

Relatively few of the scenarios, discussed above, have an explicit regional or spatial dimension. In complex, multi-sector, multi-actor, multi-factor scenarios the possible spatial impacts are frequently mentioned, but these scenarios and their accompanying computer models are anyway too large and too complicated, to include the regional or spatial dimension explicitly (and the relevant regional, or spatial data are missing in most cases). Sectoral scenarios - especially demographic scenarios - have more frequently regional dimension, because first, regional demographic data are more available and, second, demographic processes have a more stable regional and spatial pattern allowing calculation for medium and long-term time horizons.

In the scenarios, in which spatial dimension has a substantial role, the main concern is usually not the regional, but rather the urban dimension. What is the development tendency of the settlement network? Which type of towns and cities would attract more population and economic activity? What is the chance of a multipolar development? The alternative paths of scenarios are defined mostly around the above mentioned questions and problems.

Box 7. Example for scenarios of regional development. Scenarios of the regional development in Hungary until 2010. Hungarian Academy of Sciences . 1996.

Scenario	Polarised development	Moderate concentration	Decentralised (balanced) development
General character	Increasing territorial disparities, outstanding role of Budapest	Dynamic regional centres, declining periphery	Balanced territorial development
Economic growth	Stagnation, slow growth starting from the end of the nineties	Accelerating, 35 percent annual rate of growth after 2000	Very high growth rate (over 5 percent per annum)
Economic restructuring	General transformation recession, slow restructuring	Strengthening of knowledge-based industry and agriculture	General industrial renewal, business and leisure time services on international level
Migration, employment	Migration to dynamic centres, high unemployment	Migration within the regions, high unemployment	Low rate of migration, low unemployment
Spatial organisation of the economy	Weak networks, traditional industrial districts	Selective regional networks	Developed, cross-border enterprise networks
Infrastructure	Developing communication, unchanged transport axes	New East-West and North-South transport axes	New interregional linkages, housing construction 'boom'
European integration	Slow rapprochement to the EU, weak relations to neighbouring countries	EU membership, renewed economic relations with Eastern Europe	EU membership, progressive integration with neighbouring countries
Environment	Continuing environmental degradation, imported environmental threats	Sustainable environment	Sustainable environment
Regional policy	Weak regional policy	Centres of innovation in peripheral zones	Strong regional governments, decentralised regional policy

Source: Enyedi György: Regionális folyamatok Magyarországon, Budapest 1996.

The French approach is similar, but with some important differences. The centrepiece of the scenarios, prepared by DATAR (France 2020), is also the urban network. The favourite scenario 'Le polycentrisme maillé', the networked polycentrism, represents the concept, elaborated in the ESDP. One of the undesired scenarios is 'Le centrisme rénové', the renewed centralism sketches the return to the former Paris-centered model. The other undesired extreme, 'L'archipel éclaté', the split up archipelago, is a consequence of globalisation, where the internal cohesion of the country gets lost, cities and regions are attracted and controlled from outside.

7.1.9 Types of policy actions in the scenarios

Although the structure, formulation and the technical instruments of the scenarios are very different, the analysed and explored policy problems and policy options are rather similar. This is quite understandable, scenarios usually being constructed in order to answer the questions that policy makers ask most frequently. These questions are rather similar in all countries of Europe, even on the Globe.

Global problems:

• Population growth, urban sprawl, climatic change, poverty, non-renewable resources, environment, clean water, health and diseases, illiteracy, international trade relations, debt, security and piece.

European problems:

• One of the mostly explored questions is the future of deepening and widening of the Union, the future of enlargement and deepening integration. One of these factors or both of them are included as factors of uncertainty in almost all European-wide scenarios. Frequent topics are the success or failure of enlargement, its political, economic and social impacts or the chance of emerging country blocks within the EU. The conflict of national and community interests, or the application of subsidiarity are also uncertainty factors of different scenarios.

• Demography, ageing and migration are also treated in most scenarios. Especially the decline of European population and its ageing motivated the exploration of different variants and development paths.

• A large part of uncertainties concern EU cohesion policy. One of them is the relationship between cohesion policy and the Lisbon objectives. Does the support of regions lagging behind really hinder competitiveness and dynamic growth in Europe? Is the regionalisation, regional breakdown of Structural Funds really one of the principal causes of the underutilisation of funds and their low efficiency? Is there a 'value added' of the EU level management of structural policy, or should it be 'renationalised' in the more developed net contributor countries? How should structural support be distributed among countries? Several scenarios have been prepared to answer these questions.

National problems: The main policy issues are partly the same as at European level:

• Implementing or avoiding of some principal legal, economic and social reforms.
• The country's position in the globalised world and its international relations.
• Centralised or decentralised governance.
• Emphasis of policy on national economic development or on issues of regional equity. Increasing or decreasing social disparities in income distribution and welfare.

Box 8. Example for policy options scenarios: EU Regional Policy in the Enlarged Europe 2007-2013
The University of Strathclyde in Glasgow. European Policies Research Centre. 2001

Policy Options	Scenario 1 – Current Policy Approach	Scenario 2 – Differentiated Policy Approach	Scenario 3 – Concentrated Policy Approach	Scenario 4 – 'Horizontal' Policy Approach
Eligible areas for Objective 1 support	Regions under 75% GDP/head of EU 25 average	EU15 75% for old and EU25 75% for new members	Only the 'poor' countries are supported (under 90% of the average)	Regional policy 'renationalised', no area designation by the Commission
Programming	Regional programmes	Regional programmes for old and national programmes for new members	Regional programmes	Only national programmes
Commissions role	unchanged	Cohesion policy for new members	Restricted to poor countries	Supervision of competition rules
Advantages	Net payers are kept on board It facilitates policy continuity	Net payers are kept on board In CEES more appropriate approach	Subsidiarity observed. No circular flow of income	Subsidiarity observed. Integration of EU and national policies
Disadvantages	CEEC unprepared conditions Increasing bureaucracy	No support guarantee for less favoured regions in CEEC	In net payers danger of disregarding state aid rules, aid policy.	No concentration. Disregarding state aid rules

Box 9. The Interreg IIC Vision projects – an example of transnational scenarios[1]

The Community Guidelines for the Interreg II C initiative required that each of the transnational regional partnerships should prepare a vision for the transnational region - an overarching transnational planning strategy or framework. It was recognised that there was a need for, in the words of the guidelines, a coherent strategy in the operational programmes. But in most cases there was little if any history of transboundary cooperation on planning, especially at the transnational scale. Therefore it has been recognised that a start would need to be made on an overall framework in the programme itself. The intention was that each vision should provide a bridge between the ESDP and national and regional plans, and also provide a strategic framework and focus for the individual transnational planning projects funded under Interreg II C. In the framework of this report four examples of Interreg II C vision projects are compared. There were seven Interreg II C transnational regions but three have not established a vision process.

Table 7. The 4 Visions Project evaluated.

The Baltic States VASAB 2010	11 countries, including non-EU members: Denmark, Norway, Sweden, Finland, Russia, Estonia, Latvia, Lithuania, Belarus, Poland, Germany	The process began in 1992 with a ministerial conference, followed by publication of 'Vision and Strategies around the Baltic Sea – Towards a Framework for Spatial Development in the Baltic Sea Region' in 1994. A document 'From Vision to Action' was published in 1996. An updating and extension of the strategy was carried out between 1999 and 2001.
CADSES Vision Planet	17 countries, including non-EU members: all of 12 countries: Albania, Bosnia-Herzegovina, Bulgaria, Croatia, Czech Republic, Hungary, Macedonia, Moldova, Romania, Slovakia, Slovenia, Yugoslavia, and parts of the area of five countries Austria, Germany, Italy, Poland and the Ukraine	In 1997 Austria and Germany initiated the Interreg IIC project (non-EU partners could not use Interreg IIC funds, but the Czech Republic, Hungary and Slovakia used the PHARE-CBC funds for this purpose). The VISION document was published in 1999.
North Sea NorVision	7 countries: south-western Norway, western Sweden, Danish Jutland, north-western Germany, northern Netherlands and northern and eastern part of the UK	In 1998 work started ant the final document was published in July 2000
North Western Metropolitan Area NWMA Vision	7 countries: United Kingdom, Ireland, Belgium, Luxembourg, Northern France, the southern Netherlands and western part of Germany	The project began in early 1999 and a conference was held at the end of that year. The vision statement published in July 2000.

Objectives

There is considerable commonality in the general substantive objectives of the visions. All have an environmental, economic and social dimension, and seek an integrated strategy for the sustainable development of the region. The approach is very much in the form of spatial planning - coordinating the spatial impacts of sectoral policies rather than physical or land use planning. The strategies all talk of the need to reconcile the competing demands of economic competitiveness, environmental sustainability, and social cohesion. The territorial strategies concentrate on more balanced urban development across the region and improved accessibility. The common responses indicate the pervasive character of the spatial development impacts of globalisation, and the widespread belief that, despite very different governmental and physical conditions, the negative consequences can be addressed effectively through improved spatial and regional planning. There is variation in the different emphases given to particular objectives in each vision. Vision Planet concentrates heavily on the need to encourage social cohesion and orderly and controlled spatial development where there are intense competitive pressures in the transition countries. It also pays a good deal of attention to promoting and justifying the spatial planning approach to policy development and implementation. The NWMA Vision concentrates on the issues of global competitiveness and accessibility, the polarisation of economic development and provision of urban services. It seeks more balanced development across the region, whilst maintaining the global competitive position

[1] This sub-chapter heavily relies on the paper of Mr. Vincent Nadin, presented on the VISION PLANET Conference, held in Bratislava, 13-14 January 2000.

of the core cities. The objectives of VASAB and NorVision reflect their much longer standing cooperation arrangements by giving more emphasis to social considerations and the basic values of democracy and equality whilst maintaining diversity in regional development and high quality social welfare.

Contents – topics and concepts

There is much more variation on the spatial development topics that the visions address. The topics covered give an indication of the competences which are sought appropriate at this level or, in other words, the application of subsidiarity. In the visions this reflects different interpretations of the criterion of transnationality. In practice neither transnationality nor subsidiarity are discussed very explicitly, except in the case of the NWMA vision. This is a serious omission, given the current attention being paid to the question of subsidiarity. The interpretations of what can be considered a suitable topic for transnational working varies from the definition in the NWMA vision that it must be a problem which requires two or more countries to be involved in order to solve it, to problems of common interest where there may be benefit in sharing experience (although this is an inference from the content rather than an explicit statement).

One consistent feature of the choice and approach to planning topics is the tendency to focus on urban areas and networks, and to define issues and problems in urban terms. Rural issues are covered but tend to be explained in relation to the urban.

Another feature of the content of visions is the tendency to concentrate on analyses of the existing state of spatial development, that is current problems, rather than forecasting future problems that are likely to arise. Each vision has generally more description of the present and relatively little speculation about the future, although there is some consideration in all of the consequences of failing to address the long term implications of current trends.

The visions (with some exceptions) tend to concentrate heavily on spatial development relationships within the region defined, and pay much less attention to relationships between the region and other parts of the world. Exceptions include the NWMA's consideration of both the external environmental impact of the region, and global economic linkages, and the NorVision's consideration of external links. Clearly, these are very large regions and there are considerable challenges in analysis of spatial development within them without looking further afield. But there is a sense that having begun to dissolve the unnecessary national barriers to the analysis of transnational spatial development trends, new barriers are being created with a set of new boundaries. Even where the boundaries of the visions overlap as in the case of NWMA and NorVision, there is little evidence that the relationship between them have been explicitly considered.

Presentation and visualisation

This may be the most disappointing aspect of the visions. Most of the vision groups have expressed a wish to communicate policy through some form of visualisation. However, there are very few examples. There are numerous maps showing the existing state of the economy, disparities, infrastructure and the like, but few illustrations showing policy options. Also, there are few attempts to use metaphor to explain spatial development concepts and trends. The one exception is the VASAB plan where the memorable 'strings, pearls and patches' framework is illustrated in a bold way. Nevertheless, the documents tend to be fairly long and discursive. The implication is that the vision materials have been written mostly for a professional planning audience.

Process, procedure and consultation

All the visions bar one are very heavily government inspired and led - and this is also central government, although regional representatives have played their part in most cases. Consultation has not been a major feature of the vision process, except in the case of NWMA, although all the vision teams have expressed their intention to consult more widely, after the documents have been prepared. The main body of consultees who have been invited to give comments are also mainly government - other departments, local governments and government agencies. The partners involved in projects under Interreg IIC have also played a role. Therefore, governments play the major role both as vision makers and consultees. It should be recognised that consultation on such a large scale is not an easy task, and it is pertinent to point out that the visions are essentially government documents with little evidence of ownership outside the departments most centrally involved.

Finally, there is the question of methods producing the vision - the planning process. In general the visions have adopted a fairly standard, survey-analysis-plan approach. The result is that if the visions have done nothing else, they have certainly amassed a considerable amount of data, and this is an impressive achievement. This is particularly so for the two visions which include non-EU states, where availability and compatibility of information is

a serious problem. There is clearly now a much better understanding of spatial development patterns and trends in the transnational regions. The NWMA is again an exception in that analysis of the region has not been undertaken to a similar degree. Overall, in terms of the balance between the technical and political approach the former is clearly the winner.

Overall meaning and purpose of visions

To some extent all the ideas about visioning are represented in all visions, but the foregoing discussion will have indicated that some purposes are much more strongly represented than others. In terms of the product, the form of vision which comes through most strongly in all cases is the mission statement. The visions have provided a forum where a (varying) mix of interests, predominantly national and regional governments, has been able to agree a set of common principles to guide their own national and regional spatial development and planning in the future The mission statement includes a mix of substantive goal statements about spatial development patterns and ways of doing planning which are conducive to taking into account long term and transnational issues.

There is little evidence of utopian visions, and indeed the 'visions' are not at all visionary in the utopian sense. The 'vision as the truth' is more evident in all, although with mostly general statements of what the world will be like if action is not taken now to divert current trends. Given the massive dangers that are posed by continuation of current spatial development trends and the previous work that has been done on scenario building in most regions, this is surprising.

The vision processes have so far been much less about generating solutions or enabling participation, and this raises concerns, since the long term viability of the vision approach rests on generating a wider involvement and ownership of the vision objectives. This is recognised in the very heavy emphasis that is put on building appropriate institutions to underpin and strengthen future transnational cooperation. However, as noted above this is as yet mostly restricted to government and other public sector actors.

7.2 Elaboration of a scenario approach

7.2.1 Scenario approaches

We have concentrated on the long-standing categorisation of scenario approaches according to their starting point, what we call re-active and pro-active approaches. As already mentioned in the previous section, re-active approaches naturally tend towards an inductive method, beginning with the facts in hand, pro-active tend towards the deductive as it starts with the future desirable and works backwards.

(a) Re-active, prospective, exploratory or roll-forward

These approaches are 'outward bound'. They begin with the present as the starting point, and move forward to the future, either on the basis of extrapolating past trends or causal dynamics. They generally describe how the future might unfold, according to known processes of change or as extrapolations of past trends. They are sometimes described as BAU (business-as-usual) scenarios; often they involve no major interventions or paradigm shifts in the organization or functioning of a system but merely respect established constraints on future development (e.g., finite resources, limits on consumption). However, the term 'business-as-usual' may be misleading because exploratory scenarios also can describe futures that bifurcate at some point (an example might be uptake or rejection of a new technology) or that make some assumptions about regulation and/or adaptation of a system. The simplest model is a direct extrapolation of past trends (e.g. most climate scenarios, or projections of future agricultural crop productivity which are often based on extrapolation of recorded increases in productivity; Alexandratos, 1995).

The reactive approach is rooted in the military scenarios that were made by the American RAND corporation in the 1950s and the beginning of the 1960s. In a simulation game commanding officers were confronted with various possible military contexts and then asked to decide on military strategies. These contexts – called 'scenarios' – were calculated by computers (Becker, 1986). Scenarios generated by the reactive approach are usually very realistic and often have a lot of explanation power. The computer models which are applied integrate a great amount of variables and relations systematically and in a quantitative way. Besides, the model calculations stimulate the researchers to explicate their assumptions. The scope of the scenarios generated by this approach is usually limited. Variables which cannot be calculated are in many cases left out of the scenarios. In addition the introduction of new variables into the model is very time-consuming. The contrast between the scenarios is also limited because many computer programs are incapable of letting the parameters vary in a substantial way. The scenarios are usually made in a traditional way, in which only scientific experts are involved. For policymakers and stakeholders the results often become available only after the report has been published. An example is the Dutch Central Planning Agencies *Economics and physical environment* (1997).

It is possible to differentiate between various types of prospective / roll-forward scenarios by the extent to which they incorporate human action and policy intervention. Such differentiation will result in three types of prospective scenarios as follows:

Baseline or 'laissez- faire' scenarios are based on the hypothesis that the strategies and policies of public and private actors would remain almost unchanged. Baseline scenarios can be either holistic or specialist. The latter can for example focus on the impact of the evolution of mobility patterns or climate change on territorial development.

Prospective scenarios are based on the hypothesis that significant changes would occur in the behaviour and actions of actors (individuals, households and businesses) without policy intervention.

Prospective policy scenarios, as suggested by their name, are based on the hypothesis that changes would occur in one or more areas of public policy. The aim of scenarios building here is to construct territorial images which might be resulting from these policy interventions.

(b) Pro-active, normative or roll-backward

These approaches are, in contrast, 'inward bound'. They start with a preliminary view of a possible (often a desirable) future or set of futures that are of particular interest. They present, 'a picture of the world achievable (or avoidable) only through certain actions. The scenario itself becomes an argument for taking those actions' (Ogilvy, 1992). These scenarios are also categorised as prescriptive, but they actually span a wide spectrum, according to their degree of prescriptiveness. At one end of the spectrum are scenarios that are constrained in only one or a few dimensions. For example, scenarios that lead to a substantial degree of climate change sometimes are used as a reference for assessing the 'worst case' as far as impacts are concerned (e.g., scenarios that explore extreme events and tails of frequency distributions). At the other extreme of the spectrum are comprehensive, multidimensional normative scenarios that are constructed to meet the constraints of a prescribed target world. Pro-active scenarios are particularly useful for generating territorial images of for example a polycentric Europe which can then be backcasted to examine the extent to which such scenarios are realistic and what policies would be effective to achieve them and what levels of resources are needed to implement the policies. These will also help identify the key barriers to and enablers of the realisation of such scenarios.

The proactive approach is rooted in the spatial scenarios DATAR made since the beginning of the 1960s. In order to facilitate the development of regions and cities, the French institute often made one dominant scenario and several highly explorative scenarios. These scenarios were made not only by doing research activities but also design activities and other ways of creative thinking. The dominant scenario – 'scenario de l'inacceptable' – on the one hand explores the undesired impacts that may be generated by dominant trends and policies. The contrasting scenarios on the other hand explore various alternative trends and policies that may generate more desired impacts. Proactive scenarios pay special attention to the possible conflicts and synergies between the relevant sectoral and structural policies and to the most important initiators of the

policies and their most important opponents. By doing this the scenarios provide important insights into the (lack of) efficiency of these policies.

The scope of the scenarios generated by the proactive approach is usually very wide. The scenarios explore a great variety of topics in an integrated way. Besides, the scenarios often contrast significantly with one another. Design activities and creative thinking in general usually generate a great variety of desired and undesired images of the future. The scenarios are usually made in an interactive way, in which not only the researchers and designers are actively involved but also the policymakers and stakeholders. In frequently organised brainstorms, workshops etc. the policymakers and stakeholders get the opportunity to provide ideas for the scenarios and at the same time to learn from the scenario-building process. This is very important because people learn more by participating in the process then by only reading the results (Vennix, 1990). The scenarios, on the other hand, are not always very realistic and their explanation power is often limited, since the designed images of the future are often qualitative and many assumptions are not explicated. An example is the Dutch Spatial Planning Agencies *Netherlands 2030* (1997).

(c) Other possible distinctions

In addition to the basic sub-division of scenarios by their orientation, they can be classified further into various different types. In practice one and the same scenario or scenario-study may belong to different types, depending on the applied criteria. According to their *scope* they may be ordered into sectoral scenarios, exploring a single sector like the economy, and multi-sectoral scenarios, exploring several mutually related sectors. ESPON 3.2 will generate both integrated and multi-sectoral images of EU territory (such as European polycentrism involving a wide range of inter-urban functions) and more topical and single-sector images (such as sustainable transportation and mobility), exploring closely related sectors like economics, technology, and transport from the point of view of the spatial development of the EU territory.

In relation to the *level of aggregation,* they may be classified into local/regional scenarios, national scenarios or transnational scenarios. The scenarios generated by the ESPON 3.2 project will focus on the EU and national levels in the context of the global level. At the same time they will concentrate on specific regions like the least developed regions and urban areas.

According to the *measure of exploration,* they may be divided into dominant scenarios, exploring trends or policies which dominate at present, moderately explorative scenarios, exploring trends or policies deviating moderately from the present or highly explorative scenarios, exploring trends or policies deviating substantially from the present. The ESPON 3.2 project may generate one dominant (business as usual) scenario and some highly contrasting scenarios in order to highlight contradictions between policy objectives and means as well as between different geographical areas and levels.

According to their *action perspective,* policy scenarios, exploring alternative policies and their expected spatial impacts, can be distinguished from context scenarios, exploring possible courses of trends and driving forces together with their spatial impacts (a distinction also made in the reactive scenarios). The ESPON 3.2 scenarios will combine both action perspectives.

Whilst there is no limit to the number of potential scenarios which could be drawn, the project will be selective using a number criteria (such as policy relevance, spatial impact) to narrow the range.

7.2.2 Methods

Types of methods can be divided into two groups as discussed below[1].

(a) Qualitative and Quantitative

Scenarios are arguably by their nature qualitative as they are dealing with events that have not yet happened, nonetheless they can employ methods which place heavy reliance on numerical representation of developments, in which case they are classed as quantitative. These often use models, from quite simple to very sophisticated. In some cases they may use a quantitative interpretation of what was essentially qualitative data, for instance Delphi questionnaires, which involve experts putting numerical values to developments, or creating such values on the basis of the numbers of people agreeing with particular statements or forecasts.

The advantages of quantitative methods include the ability to examine rates and scales of change and to engage in basic accountancy-type testing of the consistency of different elements of the whole. Disadvantages relate mainly to the danger of 'spurious precision', but also the tendency to overlook less quantifiable variables such as political or social aspects.

Purely qualitative methods are often used where the key trends or developments are hard to capture via simplified indicators, or where such data are not available. In addition, various forms of creative thinking are encouraged by such qualitative approaches as brainstorming. Methods for working systematically with qualitative data are becoming more widely available with the development of Information Technology, for instance tools for 'mind mapping', a helpful device for facilitating meetings and workshops.

The type of method appropriate is dependent on access to relevant expertise, and on the nature of the problems being studied. Qualitative methods are better for looking in more depth at the dynamics of a phenomenon. In practice it is unlikely that there will be a complete reliance on either type of method, there are inevitable overlaps. Qualitative judgements will necessarily inform quantitative activities in the definition of a parameter or the interpretation of a questionnaire item.

(b) Expert-based and Assumption-based

This distinguishes between methods that centre on examining and articulating the views of experts, and those based more on investigating the consequences of assumptions. The *expert-based* methods seek to draw out informed opinion, evidence that underlies expert judgements and so articulate views about the future, of the trends and contingencies that may give rise to alternative futures, and of goals that should be striven for and the critical priorities and strategies here. The approach may involve large-scale surveys of opinion (such as Delphi), or much smaller and more detailed elaboration of visions (such as cross-impact analysis, scenario workshops, etc.). While results may be presented in quantitative form (e.g. Delphi estimates of the date at which particular developments will manifest), the process is essentially qualitative and interactive.

Assumption-based methods are ones that elaborate visions and priorities on the basis of knowledge that is usually already public, by their nature these are often available statistics and other quantitative forms of information. Assumption-based techniques often rely on technical expertise in, for instance setting up a simulation model to describe an issue of interest.

The key difference here is whether to rely upon data and knowledge of processes and relationships that has already been codified and subject to some scrutiny or whether to elicit opinions and guesstimates from experts as to what might be the state of affairs now and in the future. In an area of rapid change expert judgements may have to be deployed, but normally a combination of the two approaches may be used. In ESPON 3.2 it is more likely that scenario methods based on the use of expertise to be more appropriate, not least because of the existing networks of experts in place. Care should be taken to ensure that the range of

[1] This section of the report has drawn upon: FOREN (2001) *A Practical Guide to Regional Foresight*, PREST (Policy Research in Engineering, Science and Technology), Manchester.

expert opinion used is sufficiently broad as knowledge may be widely dispersed, someone may have knowledge not yet common and broader consultation helps legitimise the exercise.

The way in which experts are used varies according to the role that they play in determining what knowledge is relevant and how it can be used. Box 1 illustrates how this can be charted.

Box 1. Types of expert engagement

Experts input	**Remotely sampled**	**Physically present**
Passive	Mail, email interviews, postal surveys, e.g. Dephi	Views elicited, collected at workshops, group events, surveys, attendance mainly as observers
Interactive	Participation in computer conferences, remote groupworking	Expert panels, scenario workshops, brainstorming

Box 2. Summary of scenario approaches and methods

Type One	**Type Two**
Terminologies used: Roll forward Re-active Future forward Exploratory Extrapolative	*Terminologies used* Roll backward Pro-active Normative/Prescriptive
Description: These describe how future might unfold according to known processes of change or as extrapolations of past trends (as with trend scenarios) i.e. work out what will happen if current trends/variables continue	*Description:* These present a picture of the world achievable or avoidable only through certain actions, 'the scenario itself becomes an argument for taking those actions' (Ogilvy, '92) i.e. determine future goals/objectives then work backwards to see if or how they will be achieved or worst case scenario and how it can be avoided
Sub-divisions: Baseline/Laisser-faire: if things continue unchanged Prospective: if actors pursue certain actions Prospective policy: if certain policies are carried out	
Can use: Base forecasting – trace existing relevant variables into the future Trend impact analysis – trend identified and then anticipation of events that would lead to deviation Cross-impact matrix/analysis – consider relation of different forecasted events to each other	*Can use:* Back-casting – trace what would be needed to reach scenario

Nature Traditional Assumes top-down by analysts, users as audience, usually using set processes – e.g. morphological (Zwicky) problem – solution based methods or cross-impact, etc.	*Nature* Interactive Users as participant, workshop based elaboration of 'shared visions' Can be used to build on/refine or validate traditionally reached scenarios
Methods Quantitative Statistical forecasting/trend/cross-impact etc. Proponent - Godet	*Methods* Qualitative 'visioning', intuitive logics, more likely to be used with normative scenarios

7.2.3 Techniques

There are many ways of developing scenarios, the most well-known of these are scenario workshops, but they can also be produced for instance by smaller expert groups or as part of modelling exercises, where special efforts will be required to frame them in terms of the parameters of the model. Some of the most often utilised methods are examined below.

Box 3. Relationship between scenarios approaches, methods and techniques

Methods	**Techniques**	**Scenario Approaches**	
		Reactive / exploratory	**Proactive / normative**
Methods based on eliciting expert knowledge to develop long-term strategies	Scenario analysis workshops	X	X 'success' and 'aspirational'
	Delphi	X Conventional	X 'goals' Delphi
	Brainstorming	X	X
	SWOT analysis	X	
Quantitative methods using statistics and other data	Trend extrapolation	X	
	Simulation modelling	X	X
	Cross impact analysis	X	
	System dynamics	X	
Problem solving methods for identifying key points of action and determining planning strategies	Critical/key technologies	X	
	Relevance trees		X
	Morphological analysis		X

Each method will be examined under the following topics:

- What is it?
- The process
- How can it be used in the context of scenarios?
- Advantages
- Disadvantages

(a) Qualitative methods based on eliciting expert knowledge

Scenario analysis workshops

What is it?

This is a form of group-work or 'organisational learning' for producing scenarios, both reactive and proactive. The method consists of organising information and future possibilities into alternative visions for the future. It is especially useful to comprehend events that seem to contain a mixture of unrelated information. The aim is to shape the virtually infinite number of possible futures that could be described down to a manageable size of three to four 'futures possibilities'.

Scenario planning incorporates the following steps:

- Acknowledgement of aims;
- Assessment of the organisation's characteristics including its capability to change;
- Assessment of the environment, current and future;
- Assessment of the fit between the two;
- Development of policies and decisions and actions to improve the fit.

Participants would normally include the final users of the scenarios, and people knowledgeable of the socio-economic contexts of the area. Diversity of experience is an asset to the success of the scenario exercise. The scenario building helps participants to gain a new understanding of how change could be managed as a result of the scenario building experience. Also external people can be included especially original thinkers.

The process

Scenario workshops are one possible way to build scenarios. Firstly, a small group will be constituted – or sometimes, parallel small groups will explore different scenarios. A process will be used to obtain views as to critical choices and drivers that could differentiate or lead to distinctive futures. The most important of these will then be selected and used as the basis of an elaboration of the sorts of events that can unfold, the sorts of end-states that might be reached. The group will then typically be requested to consider what the strategic options might be for the specific scenario to be achieved, or for the key actors to be able to cope with the situation represented. A commonly used method for eliciting relevant drivers is the use of STEEPV – people are asked to identify Social, Technological, Economic, Environmental, Political, and Value-Based factors and issues. Some scenario workshops work from scratch, some begin with an existing set of scenarios and use these as a starting point, a set of images of the future to elaborate, or simply as something to criticise.

Often, creating scenarios has been compared to the process of writing a movie script where a main idea is formulated and characters are developed around it. There are a number of questions that are considered in scenarios building: What are the driving forces? What is uncertain? What is inevitable? Around these questions the following steps can be defined:

- identify the focal issue or decision
- identify the key forces and trends in the environment
- rank the driving forces and trends by importance and uncertainty
- select the scenario logics
- flesh out the scenarios
- assess the implications
- select the leading indicators and signposts for monitoring purposes

This technique works best with one or more small groups of participants (ideally 7 to 12) with at least two or three days to be divided in different sessions.

Scenarios are often used in combination with SWOT analysis, which is useful to provide the scenario planner with an insight into the strategic agenda of the final user of the scenarios.

Advantages

This method can provide planners with one point estimate of innumerable possibilities of what the future may unfold. Moreover, the method allows participants to develop plans that are viable over the wide range of possible futures with a process that helps manage uncertainty. This method helps participants to radically alter the way they think about the future. Optimisation against a specific future target is replaced by a balanced evaluation of the range of strategies that may be required. Participants understand better the alternative needs of futures and are able to develop better-informed strategies and policy options.

Disadvantages

Users may find it difficult to deal with multiple images of plausible futures. Some scenarios stay at the level of broad generalities lacking supporting analysis and quantification, and are thus not very operational. However, the method can be employed in a more rigorous manner, e.g. with extensive use of tables and other techniques for systematisation of the analysis. There are dangers with scenario approaches, in that the end-states developed may be perceived as the only possible futures – or, often, that one scenario is implicitly the 'most likely' scenario, with a couple of minor variations deviating from it. Scenarios in general are only said to work if they meet five conditions: relevance, coherence, plausibility, importance and transparency. There is a need to understand the system under study and identify the trends, issues, and events that are critical to this system.

The Delphi method

What is it?

Delphi involves a survey of people believed to be experts in the areas being studied. In the most common form of Delphi, the opinions sought concern the particular developments that are likely to happen. They may also be constructed to help identify and prioritise policy goals. One feature that makes Delphi different from an ordinary opinion survey is that essentially the same questionnaire should be filled out several times, with the respondents receiving feedback on the set of earlier responses. The idea is that the respondents can learn from the views of others, without being unduly influenced by the people who dominate at meetings. Ideally, significant dissenters from a developing consensus would be required to explain their reasons for their views, and this would serve as useful intelligence for others (unfortunately, to carry this out is time consuming, and is quite often missed out from Delphi studies.) Often the goal (and the result) of a Delphi study is to achieve convergence of opinions. There are even implementations of Delphi that are explicitly designed to identify different clusters of opinion, rather than zones of consensus.

The process

The process involves the following steps:

- Selection of the subject to forecast – usually one where there is lack of data on future trends.
- Selection of the panel of experts, representing a great variety of perspective on the subject. The experts should be aware that his/ her expertise should be made available in different rounds of the inquiry, due to its iterative nature. If the exercise is to maintain its credibility, the tendency for panel members to drop out after the first round should be minimised.
- Clarify the questions – questions should be sharp and answerable. In general questions are related to the date of occurrence of an event or development, or the possible constraints (economical, technological, social, political) to the occurrence of event or development. Piloting the survey first among a small sample of experts to refine it is a useful exercise.
- Administration of the questionnaire – preferably by a person that is responsible for the management of the questionnaire and to communicate results to the panel members.

- Analysis of responses – results are presented in a statistical manner. A common approach is as follows. For each question the median (i.e. the central tendency) and interquartile ranges (i.e. the middle half of the range outside which lie the upper and lower 25%, or quarters, of the range) are calculated. This information is the basis of the second round of the inquiry and it is sent to the panel members, who are asked to review their estimates in the light of the group opinion. Members who maintain an estimate outside the interquartile ranges are asked to provide a brief justification for their opinion. New median and interquartile ranges can be calculated and either used as the final forecast or circulated again for further refinement. The questionnaire can circulate until convergence or a set of clusters of opinions is reached, but a Delphi inquiry should not have more than four rounds.

Utilities in scenarios

Scenarios can be used in the preparatory phase of the design of questionnaires and data from literature research, patent analysis or bibliometrics added. In the analytical phase the re-building of scenarios can be used. For comments or additional explanations, qualitative analyses are necessary. The results of Delphi can be used to produce judgement on the key drivers of change that can be used to build scenarios.

Advantages

The method is ideal for predicting and assessing emerging developments where there is no empirical database, where external factors are likely to have a determining effect and where social arguments may dominate economic or technical considerations. Delphi is very useful to collect and synthesise opinions, including those which experts may be nervous about expressing without the anonymity that Delphi provides. Delphi inquiries are a valuable tool of communication for exchanging opinions on a topic, and in a sense the Delphi method is a controlled debate which avoids the domination of single persons.

Disadvantages

Delphi studies are difficult to perform well and are time consuming (i.e. a single Delphi round can easily require three weeks; a three round Delphi questionnaire requires at least three to four months including preparation and time to analyse outcomes. In addition:

- the opinions will reflect the set of participants involved: a narrow set of criteria for these may lead to unrepresentative views or miss out important sources of knowledge.
- to get persons to answer a questionnaire twice or more often is difficult and may need incentives, consequently dropout-rate increases after the second/ third round so that current studies are often limited to preparation and two rounds.
- single opinions that might be of special value are also pooled and normally ignored. Only the accumulated results are published to save anonymity. It is difficult to find out reasons for extreme answers later on, as this anonymity has to be respected.

Brainstorming

What is it?

Brainstorming is a widely used group method, involving a period of freethinking, which is used to articulate ideas. These are collated and written down without critical comment, though ideas may be spun off from earlier ideas. These are then grouped, prioritised, etc., and taken as the basis for more analytic discussion.

The main objective of brainstorming is to elicit ideas from a group of people. Used in a structured manner, this tool can be highly effective to move participants out of conflict and towards consensus. Brainstorming is founded on the principle that the quantity of ideas increases their quality.

The process

This technique has the following basic components:

- Generating as many creative ideas as possible (stage of diverging);
- Listing every idea presented without comment or evaluation - deferring the judgement of ideas improves the volume of participant input and consequently its value and encourages creativity;
- Subsequently, grouping ideas to reduce redundancy, allows for related ideas to be brought together;
- Evaluating or assigning priorities to the ideas (stage of converging).

Anyone can participate in a brainstorming session, though expert committees are well suited, as are participants from diverse backgrounds in the issue to be discussed. Effective brainstorming sessions are small (from 7 to 12 participants). Larger groups should be divided into smaller groups. The requirements are; a facilitator; a way to record all the ideas/information (e.g. a facilitator, and/or a whiteboard, flipchart, etc. – there are now also computer-based group decision aid software tools that support brainstorming and other activities described here). First, the topic is introduced and the purpose of the specific brainstorming session clarified (briefing information might be sent in advance to participants). The discussion may start by asking a specific open-ended question to focus the discussion (there is no rule for the length of a session; sometimes the group should define in advance a target number of ideas). The gathering of ideas can be managed by using different types of techniques to boost productivity of brainstorming, using for instance mind-mapping (see below). When the group feels comfortable that there are no more ideas to add, revisit the list of ideas, group the ideas together, ask clarification or more information on what was meant by each item.

Utility in scenarios

Brainstorming can be used in the earlier stages of the process of scenario generation. Brainstorming helps participants to move into a working group mode, by 'breaking the ice' and allowing unusual ideas to be expressed that are an essential component in the preparation of scenarios. It can be also be used when a large quantity of information is generated in scenario analysis.

Advantages

The freethinking atmosphere of brainstorming encourages creativity; even imperfectly developed thoughts may push the thinking of other participants. Problems are defined better as questions arise – alternatives appear in a new or different perspective and novel approaches to an issue can arise during the process. Brainstorming helps to reduce conflicts – it helps participants to see other points of view and possibly change their perspective on problems. In theory at least all participants have an equal opportunity to participate.

Disadvantages

Sometimes the ideas produced are wild (Slaughter, 1996) and unworkable (these ideas, however, can always be 'forced to fit'). The outcomes depend on the ability of the facilitator of maintaining the discussion alive. Opponents may refuse to consider each other's ideas.

SWOT (strengths weaknesses opportunities and threats) analysis

What is it?

SWOT analysis is an analytical tool, which should be used to categorise significant impacting environmental factors, it is best used as a dynamic technique, not a static analytical tool with emphasis solely on its output.

The process

The SWOT is often portrayed as a 2x2 matrix and it identifies through means of a chart a reasonable overview of major issues that can be taken into account in subsequently drawing up strategic plan. The development of Opportunity and Threats matrices leads to an assessment of the likely probability and impact

of any factor, and it is possible to apply a scoring system to assess the importance of factors. A factor that scores highly on both 'probability of occurrence' and on 'likely impact', would have to be one worthy of close attention and play a significant part in the development of a strategic plan. Similarly, Strengths and Weaknesses can be assessed against a scoring system that allows the factors to be identified according to their significance (i.e. major, minor, neutral) and level of importance (high, medium, low).

Utility in scenarios

SWOT analysis can be used as one step in the process of scenario building and with scenario analysis. It can be used in brainstorming and prior to a Delphi survey to help focus the Delphi questionnaire.

Advantages

SWOT analysis involves the collection and portrayal of information about internal and external factors that have and may produce a list of the threats and opportunities that an analysis of its environment identifies. Strategic logic requires that the future pattern of actions to be taken should match strengths with opportunities, ward off threats and seek to overcome weaknesses.

Disadvantages

The technique is often criticised for being based on an inadequate definition of factors which are not prioritised. There is also a tendency towards the over-subjectivity in the generation of factors and compiler bias.

(b) Other methods based on eliciting expert knowledge to develop long-term strategies

- **Expert panels**

The constitution of panels of scientific of policy experts are not a 'method' as such, but specific methods may be employed to motivate the panel, assign tasks, and elicit sharing and further development of knowledge used. Participants in such a panel could be asked in a systematic manner to provide observations and judgements about important developments that are underway or expected. Two principles are important for the composition of the pane: (1) each expert holds a strategic position in policy-making or in the scientific world and (2) all the experts together represent a great variety of perspectives on the subject. The composition could change over time with rotation, which is encouraged to bring in fresh views into the process. Communications media can take many forms.

Positive features of panel work include: the gathering of relevant information and knowledge; the stimulation of new insights and creative views and strategies for the future, as well as new networks and the diffusion of results to a wider constituency

Problems with panels may relate to a too narrow representation (little challenging thinking, perceptions that vested interests are in charge, the 'capture' of independent members by well-resourced interest groups). Also an expert panel cannot produce a statistically significant outcome. The results provided by a panel will not predict the response of a larger population or even the findings of a different panel. They will only represent the synthesised opinions of the particular group.

Brainstorming and SWOT analysis are techniques that can be used in scenario building, and Scenario Analysis Workshops themselves are methods frequently used with Panels and expert groups. Using smaller expert groups may be a valuable approach where there is an explicit effort being made to develop and contrast scenarios based on different theoretical perspectives.

- **Mindmapping**

Mindmapping is a technique applied to brainstorming and other group discussion methods (for example where people are talking about the relationships between a large number of factors). It allows for quickly charting group's ideas in logical groupings, even when ideas are given in a non-sequential manner. This technique allows to efficiently brainstorm for ideas, and at the same time create a skeletal framework for later categorisation of the information generated. Mindmapping can be used in planning and works well when issues have many components and subcomponents. This technique is a non-linear way of outlining information. It is possible to implement it with 'pen and paper', but there are available dedicated software tools, allowing for the visualisation in real time of the developments of the brainstorming.

(c) Qualitative methods using statistics

- **Trend extrapolation**

In essence this involves the location of a trend that is apparent over time and the projection of forward data concerning the rates of change and the extent of change achieved. In shorter-term forecasts this is often a matter of extending a linear or exponential curve – e.g. economic growth, power or diffusion of a technology, but in the longer-term there may be problems, for instance in limits to growth.

The chief problems encountered with trend data include:

- Historical data is limited, and trends are guessed at or inferred on the basis of assuming that population group or country A will do tomorrow what group or country B is doing today.
- Assumptions that the underlying driving forces will persist, ignoring the possibility that counter-trends could come into play.
- Difficulties in estimating at what point ceilings or turning points will be reached.
- Whether the quantitative trend may be masking qualitative change

- **Simulation modelling**

An attempt to take certain variables from 'reality' in some area and create a computer model or game situation in which one can see how those variables might interact with each other over time. Computers or humans (as role players) or both can be involved. With computers, human can play 'what if' games, where by making certain choices, they can then see the consequences (in terms of policy) that follow from those choices. Modelling has been most developed around relatively easily quantifiable issues, such as economic growth, employment, energy use, and demographics. In recent years important modelling efforts have been undertaken in examining climate change and environmental impacts. Modelling social, political and cultural change is much more contentious.

Issues frequently raised in modelling are:

- Who validates the data and relationships assumed? Are there independent experts able to assess the quality of the modelling effort? How far can key assumptions be debated, even by non-experts?
- Is the model over complex, do even the designers understand how it works? Can it be simplified?
- Is the model able to cope with structural or qualitative changes on the horizon?
- Does the model assume that an equilibrium state is to be reached? If so, is this remotely realistic – and is the passage of time taken to reach this equilibrium based on serious analysis, or is it just a matter of faith?

- **Cross impact analysis**

This is an important technique in the preparation of scenarios and is typically expert-based (being dependent, in much the same way as Delphi technique, on the ability of experts to provide meaningful estimates of event

occurrence probability) as well as a quantitative method. The approach is to ask the experts to rate the likelihood of various events occurring, and furthermore to rate the likelihood of each occurring if each of the others does or does not occur. The matrix of possibilities that arises from this can be subject to mathematical analysis to generate a list of scenarios, each with an aggregate probability of occurrence assigned to it. The cross-impact method forces attention to chains of causality: *'x'* affects *'y'*; *'y'* affects *'z'*. The definition of events to be included in the study can be tiring and tedious but is a crucial step in a cross-impact analysis. Any influences not included in the event set, will be completely excluded from the study, their inclusion would complicate the analysis unnecessarily.

Cross-Impact matrices were developed in '…recognition of the fact that forecasts of future events, when made in isolation from each other, fail to take their mutual effects into systematic consideration and thus lack a degree of refinement whose addition, it was felt, might well increase their reliability'. (Helmer, 1983) However it is not widely used as it is very demanding of the experts who are a major source of the data used and is only suitable for dealing with a small number of key variables.

- **System dynamics**

System dynamics is a commonly used forms of computer simulation for dealing with many faceted problems, it seeks to find the conditions under which a system under study will evolve into what direction. It aims at considering the interrelationships among the components of an organisation or environment rather than looking at each component in isolation. A system dynamics application starts with the identification of a problem. The modellers should then draw in all major patterns of influence that together create the 'system' that produces the problem. A successful model is able to simulate these patterns and produce system behaviour. Different values for variables and different policy structures may then be introduced to simulate how the system would respond to different circumstances or initiatives. This method searches for the causes of system behaviour that lie within the system, with events 'outside' serving as triggers rather than causes.

System dynamics models are useful for understanding and anticipating changes over time in puzzlingly complex systems and can be used with what are thought to be 'data poor' problems. This method can be useful to gain insight and understanding in a messy situation but is only capable of running one version of a situation at a time. The picture produced might be very dependent on the initial agenda and assumptions of those doing the 'modelling'. A system dynamics diagram can become very complex when situations with lots of variables are modelled.

(d) Problem solving scenario techniques

The final group of techniques aim specifically at prioritising and planning. They would thus generally be used at the less open-ended range of scenario building. SWOT analysis could also be included here (see above). Some other tools that are geared to defining key actions and priorities will be briefly described here;

- **Critical/key technologies**

This involves focused discussion by experts on new technologies, prioritizing their importance to facilitate further discussion on their effects and necessary actions to help with their developments. The method can in principle be applied to things other than technologies. It consists of applying sets of criteria against which relative importance can be measured.

The value of the technique here may be seen just as an exploratory step that draws from a wide range of informed expertise and normative opinions. The outcomes of a critical technology process can be used as inputs to define and debate policy.

- **Relevance trees**

A technique which aims to map out the sequence of events, and in what order, that are necessary to get from where you are now to where you want to be as your end goal by some future date. It is therefore an analytic tool that subdivides a broad topic into increasingly smaller subtopics, used to analyse situations with distinct levels of complexity, in which each successive lower level involves finer distinctions or subdivisions.

A relevance tree looks much like an organisational chart and presents information in a hierarchical structure. The structure should lead to a clearer understanding of the topic under analysis. However, as the development of relevance trees require critical judgement, the possibility of human error is present. Moreover, if the underlying thought processes are not insightful, the outcomes of this method will be weak.

- **Morphological analysis**

This method is often used as complementary technique in conjunction with relevance trees. It involves mapping a discipline to obtain a wide perspective of existing solutions and future possibilities. Morphological analysis has often been used for new product development but also in constructing scenarios. The approach can be based on five basic steps:

- Formulation and definition of a problem;
- Identification and characterization of all parameters toward a solution;
- Construction of a multidimensional matrix (morphological box) whose combinations will contain all possible solutions;
- Evaluation of the outcome based on feasibility and achievement of desired goals; and
- In-depth analysis of best possibilities considering available resources.

The purpose of morphology is to organise information in a relevant and useful way in order to help solve a problem or stimulate new ways of thinking. No ‘right’ or ‘wrong’ way exists for constructing a morphology. Good knowledge about a problem or issue, however, is essential to developing the most effective morphological framework.

Box 4. Scenario generation process

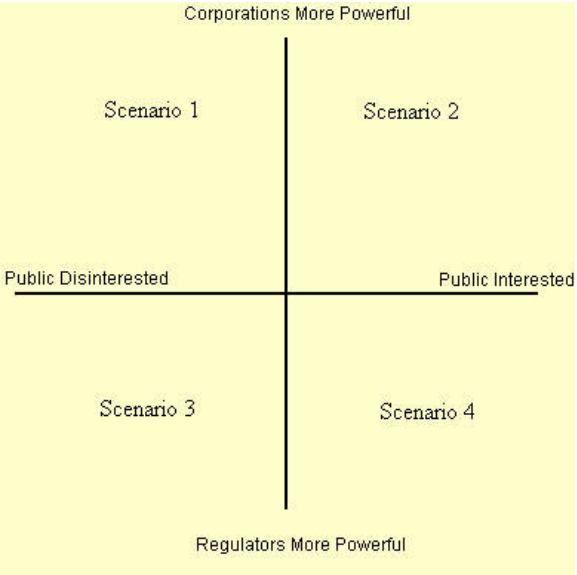
Generating scenarios

The creation of scenarios may be based on several techniques, but the process or order of exercise typically follows the following sequence:

i - An area or focal issue for investigation and a time frame are chosen.
ii - Information is gathered on current trends and policies, their mutual relations, and their possible spatial impacts.
iii - The driving forces behind the trends and policies are identified.
iv - The trends and driving forces are organised into several reactive scenarios:
• by combining a possible low dynamic course of driving forces in a 'low scenario' and a possible high dynamic course in a 'high scenario',
• by generating first various leading ideas about the possible courses of the driving forces and than combining these ideas into three possible courses or
• by selecting two driving forces (by using a scale of importance and of uncertainty) and combining them into a scenario matrix (see Figure 10 below)[1]

The desired futures together with the policies that are required to realize them – given the possible courses of the driving forces – are organised into several proactive scenarios. This can be done in a similar way as step iv.
The reactive and proactive scenarios are organised into a single set of 3 or 4 scenarios, e.g. by combining 2 reactive and 2 proactive scenarios or by selecting other combinations.
These scenarios are elaborated by developing story lines and by doing further research and design activities.
Policy recommendations are derived from the scenarios by comparing them in a systematic way with one another and with the present situation.
Scenario assessment is applied by identifying indicators which tell in which direction the trends are actually heading.

Figure 10. Scenario matrix.



[1] Early scenario work produced many examples based on permuting all driving forces, but recently scenario methods have favoured developing a limited number of scenarios, by using a matrix (as shown above) containing four quadrants or combining only forces considered both uncertain and important.

7.2.4 Approaches to be used in ESPON 3.2

(a) General considerations

The TPG proposes a number of specific considerations for the use of scenarios in ESPON project 3.2. These are as follows:

• Time horizon

The terms of reference indicate two time horizons: the year 2015 for the mid-term (broadly 10 years after the completion of the scenarios) and 2030 for the long-term (broadly 25 years after the completion of the scenarios. This has several consequences. Long-range scenarios are particularly well suited to express trend evolutions (laisser-faire) and ambitious strategies: while it is totally unrealistic to expect a polycentric territorial pattern in Europe for the year 2015, some forms of polycentrism may have already crystallised by the year 2030 under certain conditions. On the other hand, the territorial effects of a given set of policies will appear more clearly and with higher relevance in the medium-term than in the long-term.

• Quantitative and qualitative approaches

Scenario building gains by using both quantitative and qualitative approaches. Qualitative approaches are useful to ensure a holistic appraisal of strategic factors, including those which are not quantifiable. Quantitative approaches are useful for ensuring the coherence of the scenario, to identify the dimension of processes and to depict incompatibilities. This last aspect is particularly important because incompatibilities may lead in some cases to the re-orientation of the scenario as well as for seeking solutions for potential contradictions. The proposed integration tools will ensure an adequate balance between quantitative and qualitative approaches (MASST model and meta-models in particular).
An example of complementarity between quantitative and qualitative approaches in the macroeconomic field is what can be called 'conditional scenario building'. This defines the main elements of bifurcations in the evolutionary path of the regions and an indication of a range of probable futures (e.g.: in the past, one of these elements was the adoption of the common currency, forcing in precise directions the macroeconomic and monetary policies of member states). The simulation model will work on pure extrapolation or take into account the possibility of conditional events (political, diplomatic, economic, socio-cultural, etc.). These conditional events are part of the qualitative scenario building procedure, and refer to events that cannot be anticipated (yes/no).
The TPG proposes a balance between a qualitative definition of scenarios and the scientific validation by the use of quantitative models based on precise data, whenever possible. The scenarios generated by this approach combine a wide scope and a high contrast on the one hand with a high level of realism and explanation power on the other. Combining both approaches is not an easy task because this implies the integration of two different paradigms and intensive cooperation between researchers and designers who talk, think and work in very different ways. Therefore much attention must be paid to the application of the cyclical process! (see below)

• Multi-scale approach

As the European territory is rather heterogeneous, it seems advisable to split up a number of global European scenarios into a limited number of European sub-regions (such as the transnational Interreg IIIB programme areas) or of more homogeneous areas (centre versus periphery, developed versus developing, etc.) without loosing global coherence. This will have a double advantage: the possibility of using information available at that level through a bottom-up approach (databases, spatial visions, projections etc.) and the possibility of adapting the strategy and the outcome of the scenario to the specificities of the areas (territorial differentiation in scenario building). In addition to the two main scales (macro and meso), a number of

scenarios will also be developed to provide an insights into more regional and local aspects, such as urban systems, rural areas, coastal areas, border regions, islands, mountain areas etc.).

• Scenario mapping and visual representations

Mapping of territorial scenarios is a specific technique, the aim of which is generally to represent visually ideas and concepts, as well as dynamic elements and policy elements, while conventional cartography represents data and statistics.

• Scenario assessment

Scenario assessment is an important step which makes it possible to draw conclusions on the level of correspondence between the final territorial image and the commonly agreed objectives (socio-economic and territorial cohesion, polycentricity) or on the appropriateness of policies to reach the desired image of the territory. In this way, the prospective scenarios can be compared in order to provide insight into the feasibility of the desired images of the territory, and the pro-active scenarios can be compared in order to gain insight into the contributions of different policy strategies to the desired images. A scenario matrix would allow viewing the relation between the two. The assessment of territorial scenarios generally requires rather integrative instruments and indicators. In this respect, the experimental European Territorial Cohesion Index, to be developed, could be of interest to classify scenarios according to their impact on territorial cohesion.

(b) The cyclical approach

The quality of scenarios and their usability can significantly be improved by combining the best characteristics of the reactive and proactive approaches described in section 2. This can be done by building the scenarios into a cyclical process, see Figure 11 below. The techniques described in section 4 may be very helpful in this process. By going through several cycles design activities and model calculations alternate. The same is true for the qualitative and quantitative analysis and for the interactive and the traditional way of working.

The scenario cycle consists of several building blocks. The *basic analysis* provides an overview of the most important issues related to the present EU territory and cohesion, the most relevant policies and programmes, and the most important trends, together with their driving forces. By doing this analysis the TPG will generate an overview of the complex interrelations between social, economic, technological, political and other factors and the territorial impacts they generate. The basic analysis provides a scenario base, i.e. an organised and structured representation of the present reality as well as a system of dynamic elements connected to each other and to the external environment.

The *reactive* scenarios explore in an integrative way some possible alternative courses of social, economic, technological and other trends that affect the territorial development and the cohesion of the enlarging EU together with their driving forces and their territorial impacts. They do this for various scales of time and space. The prospective scenarios not only pay attention to (regular) trends but also to (irregular) turning points and so-called low-probability-high-impacts-events that may change the courses of the trends dramatically.

The *proactive* scenarios explore some alternative desired (or undesired) future states of the EU territory and cohesion together with the EU, national and regional policies that may realise them, given the possible future courses of the trends and driving forces explored by the prospective scenarios. Proactive scenarios pay special attention to the possible conflicts and synergies between the relevant policies and to the most important initiators of the policies and their most important opponents. By doing this the scenarios provide important insights into the (lack of) efficiency of these policies.

The *policy recommendations* provide an overview of the most important policy issues and policy options related to the EU territory and cohesion for the years to come. They will be derived from a systematic comparison between (1) the prospective scenarios, (2) the prospective and the proactive scenarios, and (3)

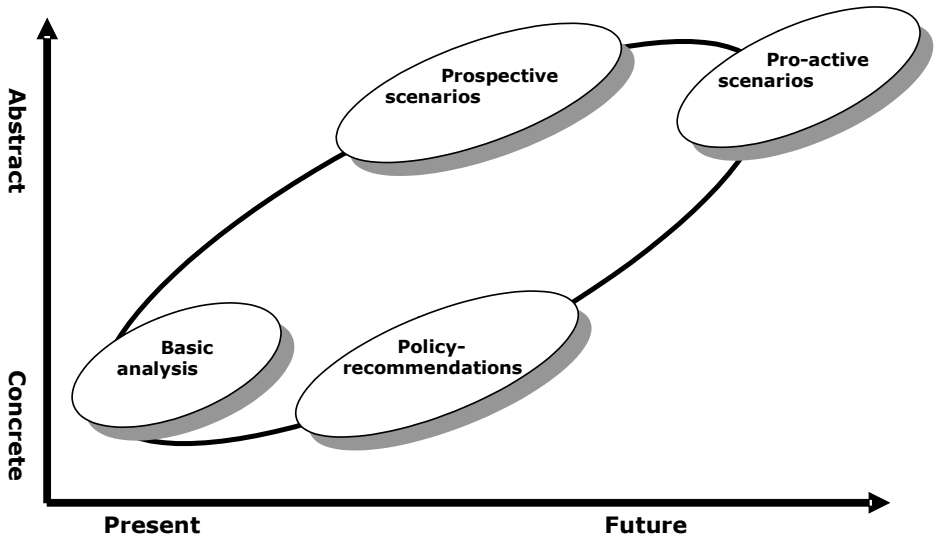
the scenarios and the results of the basic analysis ('0-scenario'). This will be done by applying scenario matrices. The policy recommendations will be applicable to EU policies, but also to national and regional policies. They will embody guidelines that European and national spatial and related policies should follow depending on given (political) choices of objectives.

Every building block just described consists not only of a synchronic analysis but also of a diachronic analysis. A *synchronic* analysis describes a situation at a certain time, e.g. the present or a future state of the system and its environment. A *diachronic* analysis shows the evolution of a number of factors or variables during a period of time, e.g. short or long term trends, driving forces, and policies.

The building blocks are defined and worked out in a cyclical way. Every cycle makes a movement from the present (basic analysis) via the long-term (prospective and proactive scenarios) to the short-term (policy recommendations) and from the concrete (basic analysis) via the abstract (prospective and proactive scenarios) to the concrete again (policy recommendations). In these cycles the building blocks are loosely coupled with one another. They are not always neatly worked out one after another. Some may for instance be worked out in parallel. Besides, some building blocks are worked out more in detail than others.

By going through this cycle several times the TPG will develop, work out and test the building blocks in a gradual way. The cyclical process will be helpful to integrate the large amounts of knowledge and information which are necessary for scenario-building by first sketching the main lines of the scenarios and then working them out. The first cycle is most qualitative in character, ensuring a holistic appraisal of strategic factors, including those which are not quantifiable. The last cycle is most quantitative in character, being useful for ensuring the coherence of the scenarios, to identify the dimension of processes, and to depict incompatibilities. The cyclical approach also makes the complicated project much easier to manage, since the approach enables the MC, other stakeholders and the TPG to build a common vision on the project results and to gradually work them out (see Figure 11).

Figure 11. Cyclical scenario approach.



• The first cycle

The first cycle consists of a scenario analysis workshop. The organisation of the workshop requires the constitution of an expert panel. In the workshop the experts are invited to generate a great amount of ideas for the building blocks of the scenarios, e.g. ideas about the most important issues related the EU territorial development, the most relevant trends and driving forces, and the most interesting policy alternatives. Besides they are invited to generate ideas about the names of the scenarios, their main characteristics etc. The generation of ideas can be stimulated by techniques like brainstorming and SWOT-analysis. The ideas are not only expressed in words but also in icons and on maps. Prior to the workshop the Delphi technique is applied in order to prepare the experts for the workshop and to enhance its efficiency. After the workshop the results are structured and worked out by the TPG. In order to be able to do this properly it is important that the discussions during the workshop are reported or recorded.

• The second cycle

In the second cycle essays about (parts of) the building blocks are written and maps are worked out. In the essays the structured results of the workshop are further written out in for instance different storylines for the scenarios. This requires the review of a great amount of literature. The analysis of the results that are generated by the existing ESPON projects plays an important role in this cycle. In order to enhance the creativity of the essays techniques like mind mapping or brainstorming can be applied. Techniques like relevance tree or morphological analysis may be helpful for further analysis. The maps that were only roughly outlined in the workshop are now worked out in order to express the building blocks not only in words but also in images. Additionally, the making of maps stimulates creative thinking about the possible or (un)desirable future states of the EU territory and its cohesion, allowing to recognize synergies and conflicts between sectoral and structural policies. The writing and the mapping must be well coordinated in order to stimulate cross-fertilization.

• The third cycle

Variables and indicators are derived from the essays and maps in the third cycle. Besides some additional research activities are done. The application of techniques like system dynamics and cross-impact analysis may be helpful by making the great amounts of variables and relations explicit and by providing overviews of them (Vennix, 1996). The research activities consist of an additional review of relevant literature, e.g. scenario reports published by the OECD and Member States, and of interviews with scientific and policy

exerts. The interviews are especially relevant for the validation of the explored trends, driving forces, and policy impacts in the candidate countries and the neighbouring countries.

• The fourth cycle

In the fourth cycle data for the relevant variables and relations are gathered and trend analyses are made. Although the data will be derived from the other ESPON projects whenever possible other statistical sources must be tapped, as the time period of the available analyses is too short for long-term scenario building. Compromises will have to be made, either in taking larger spatial units or in covering only a part of the EU 27. The trend analyses will be made by the aid of computer models, like forecasting models for demographic and economic trends. The future trends will not simply be extrapolated from the past. The consideration of evolution in the chains of causality is also necessary. The focus will be on factors of change which might induce new dynamics and even trend reversals in the medium and long term. The gathering of data and the analysis of trends requires a great amount of work. Therefore this cycle will parallel the other cycles.

Consultation and validation play an important role in every cycle of the scenario-building process. In the next section, we outline our propositions for the entire consultation process.

Important issues for scenarios

The following list contains a first set of hypothesis regarding European trends and policies. It should be seen as a basis of discussion in Lillehammer and as a general indication of the issues that our scenarios will have to deal with.

Cohesion drivers: economic and monetary integration policy

- Euro: lower transaction costs and interest rate differentials
- Macroeconomic stability
- Price convergence with differences among sectors
- Significant growth in trade
- Growth in foreign direct investment
- Competition policy improves internal market
- Companies become larger
- State aid to firms by Member States still represents 1% GDP
- 0,45% cohesion policies contribute to national convergence

Demography: how many people will live in Europe in 2020?

- EU15 stable around 380 million in 2020
- Europe is aging
- Public expenditure 3-5% GDP with public 'orderly default',
- In low-income countries more than 40% of the population is under 20, as opposed to less than 25% in EU15
- 32 million more people in Southern Mediterranean countries
- Strong migration pressure

Transport: Endless mobility

- Increase in traffic, especially roads, following GDP growth
- Bottlenecks: congestion in main roads and rail routes, towns and airports (6% annual fuel consumption, 1% GDP)
- Harmful effects on the environment (28% CO2), public health, and safety due to road accidents
- Missing links: Excessive isolation of outlying regions, especially accession countries and border areas
- Lack of investment on infrastructure and new PPP financing (from 1.5% GDP to 1%GDP)
- Opening-up of markets, excepts for rail, but unfair price structure to cover real costs and externalities and interoperability problems (rail energy supply, road tolls...)
- Growing demand and supply shortage

Sociology: virtual communities

- Multicultural societies
- New family structure: people living alone (33% Germany)
- Children born outside wedlock (75% in Nordic countries)
- Longer periods in school
- Universal individualism
- Work as self-fulfillment, one-person firms
- Decline of conventional religions
- Multiple purpose-oriented and local-based communities
- More voluntary just-in-time relations

Economy: from New Economy to Now Economy

- Moderate GDP increase (annual 4% since 1945 worldwide)
- Increasing trade flows (annual 6.3% since 1945)
- Increasing foreign direct investment
- Increasing daily turnover of world financial market
- Increasing gap between rich and poor countries, between EU15/25 and neighbouring countries
- Higher demand for more skilled workers
- Need for higher R&D investment
- Globalisation trends

Environment: a totally arficial world

- progress in establishing a comprehensive system of environmental control over the last 30 years, progress in air and water control and integration of environmental objectives into other policy areas
- ongoing problems: climate change, loss of biodiversity, soil degradation, waste volumes, building-up of chemicals in the environment, noise and certain air and water pollutants
- increasing pressure on natural resources over the coming decade with current policy and socio-economic trends
- Better environmental quality and more risks

The governance challenge: more participatory and knowledge-base decisions

- Growing complexity of public affairs: powerless institutions
- Self-determination of groups and territories
- Growing vulnerability and insecurity
- Internal conflicts
- Higher citizen demand of public institutions
- Project-oriented government
- Openness, participation, accountability, effectiveness and coherence
- Need for more knowledgeable participatory decision-making processes

Possible hypotheses for a first series of discussion scenarios

On the basis of the methodological considerations developed above and in order to start the elaboration of scenario sketches, a series of possible hypotheses for discussion scenarios is presented hereafter. These will be examined and discussed in the June 2004 TPG meeting and a choice will be made of a limited number of hypotheses (including possibly additional hypotheses) enabling immediately the development of scenario sketches and the consultation of experts and political representatives.

1. Roll forward (prospective; exploratory) scenarios.
These comprise three sub-categories:

a) Baseline / 'laisser-faire' scenarios.

This category includes:
- Holistic(cross-sectoral) scenarios
- Specialist scenarios: emphasis on a limited number of factors (mobility patterns, climate change etc.)

Startpoint: present situation and trends

Basic assumption: the strategies and policies of public and private actors would remain almost intact

Aim: To construct territorial images resulting from unchanged strategies and policies.

Examples of hypotheses for 'specialist baseline scenarios':

- change in demographic structure (aging of Europe)
- progress in economic globalisation;
- progress in economic structural changes (further increase of service activities; further decrease of manufacturing and agricultural activities);
- progress of traffic flows on major corridors;
- generalisation of low-cost air transport;
- progress in gender equality and in empowerment of women.

b) Prospective scenarios:

Startpoint: present situation and trends

Basic assumption: significant changes would occur in the behaviour and actions of actors (individuals, households and business) without new policy intervention

Aim: to construct territorial images resulting from significant changes in the behaviour and actions of actors.

Examples of hypotheses for prospective scenarios:

- strong increase of international migrations within the enlarged Europe and from outside Europe
- strong increase of energy price;
- changing interregional/international division of labour within the enlarged Europe;
- acceleration of climate change.
- exploration of new technologies likely to develop in the next two/three decades and to have a significant impact on the EU territory.
- generalisation of terrorism

c) Prospective policy scenarios

Startpoint: present situation and trends

Basic assumption: changes would occur in one or more areas of public policy

Aim: to construct territorial images resulting from changes in one or more areas of public policy.

Examples of hypotheses for prospective policy scenarios:

- progress in the regionalisation of public policies;
- integration of sectoral policies at EU and national level;
- strong promotion of maritime transport;
- increased expansion of high-speed railway networks;

2. Roll backwards (pro-active; normative) scenarios

Startpoint: View of a possible future territorial image which presents a certain interest, either as desirable or as avoidable situation

Basic assumption: strategies of private and public actors are free (up to certain limits)

Aim: to investigate if and how these futures might or might not grow out of the present, what might be achieved or avoided, given available constraints, resource and technologies.

Examples of roll-backward scenarios:

a) Rather undesirable scenarios:

- increasingly dualised rural areas with some specialising in intense production and use (agriculture, suburbanisation, intensive tourist/leisure activities) and others being progressively abandoned;
- strong densification resulting from settlement activities in coastal areas;
- expansion of the Central European Growth Area (pentagon) along major axes at the expense of potential growth areas in the periphery.

b) Rather desirable scenarios:

- more polycentric settlement structure at various scales;
- better balanced distribution of traffic flows and generalisation of environmentally-friendly transport modes and systems;
- more balanced accessibility among European regions;
- settlement structure better protected against natural hazards.

7.2.5 Conclusions

Generally speaking scenarios are made in order to enhance the quality of strategic decision-making. The ESPON 3.2 project will generate scenarios in order to facilitate policy development in relation to the ESDP and the Territorial Cohesion in the context of an enlarging EU.

The ways in which scenarios can facilitate policy development include providing insights into the most important trends and driving forces determining the territorial development of the EU 27 plus the neighbouring countries and insights into the structural difficulties and potentialities these trends and driving forces may generate on the European, national, and regional level. They can present holistic, integrated images of how the future might evolve. Context scenarios and prospective scenarios are important in this respect. In addition scenarios may explore some alternative policies at the EU, the national, and the regional levels together with their territorial impacts. This may enhance synergy and well co-ordinated decisions relevant for the territorial development and the cohesion of the enlarging EU. The scenarios may focus on the Trans-European Networks, the Structural Funds, the Common Agricultural Policy, the Environment Policy, and the Research & Development Policy. Although the policies just mentioned have no immediate spatial character they generate important territorial impacts. The alternative policies will be explored in an integrated way and will be assessed in relation to important policy objectives, like economic, social, and territorial cohesion, competitiveness of different regions, and sustainable development. Policy scenarios and proactive scenarios are relevant in this respect.

Furthermore, the scenarios may provide some points of reference for the communication among the policymakers and stakeholders involved in policies at the EU, the national, and the regional levels. In this respect it is important that the scenarios embody different but comparable images of the future. Policy-makers and stakeholders may refer to these images in order to communicate their expectations and their desires related to the trends and driving forces determining the territorial development as well as to the objectives just mentioned. In this way the scenarios may be helpful to nourish visionary discussions at the European level concerning the territorial structures of an enlarged EU. Highly explorative scenarios may reflect expectations and desires of various policy-makers and stakeholders, stimulating their receptivity for them.

Finally, the scenarios may provide the policymakers and stakeholders involved in spatial planning at the EU and other levels some ammunition to gain support for the policies they prefer. This is especially true if the set of scenarios contains a dominant scenario and several highly contrasting scenarios. While the dominant scenario may explore the continuation of dominant trends and present policies together with their territorial impacts, the highly contrasting scenarios may explore alternative trends and policies generating more desired impacts. At the same time the scenarios may provide insights into the most important initiators and supporters of the alternative policies and into the most the important opponents as well. Multi-sectoral and multi-level scenarios are also important in this respect.

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8 Consultation & scientific coordination

As mentioned in the previous chapter, the scenario building process is inherently interactive with a constant feedback between scientific analysis and political choices. At the same time, the scope of the task and the scale of territorial coverage demands expert validation of the work done within the TPG in order to ensure a sound scientific basis. This chapter introduces some ideas on how to organise such interaction.

Linked to this, is the task of scientific coordination of the ESPON platform which is going into a new phase with the end of a series of projects and the launch of several new ones. The question of future directions of the coordination task is also developed in this chapter.

The first section offers ideas on how to organise the consultation of the MC, but also of experts, notably via the ECP network. The ideas introduced in the section were discussed in Lillehammer in order to allow the TPG to act in accordance with a realistic assessment of the possibilities of the MC and of the ECPs. The section also describes some of the specific consultation methods to be used.

The second section concerns the 'ESPON Knowledge & Communication Tool', a web site that will be enriched during the course of the project to centralise information of value to ESPON and will allow interactive viewing and retrieval of data. As such it will serve as the central ESPON knowledge base during the project.

Project 3.2 only takes over the coordination at the end of the year, so the third section develops ideas concerning the transition phase. This section will be fleshed for the final version of the present report.

8.1 Recommendations for a communication & consultation strategy throughout the project

8.1.1 Introduction

This report represents a preliminary assessment and set of actions in relation to the communication, consultation and validation process for ESPON 3.2. These issues were further discussed and clarified at the ESPON seminar Lillehammer, May 2004. The following sections outline the communications and validation approach to be adopted over the duration of the project. Before proceeding to the specifics of the communication and validation approach suggested, a short outline of the role of scenarios in strategic decision-making is presented.

8.1.2 Scenarios in Strategic Decision Making

The ESPON 3.2 project is intended to generate scenarios in order to facilitate improved decision-making and policy development in relation to the ESDP and territorial cohesion in the context of an enlarging European Union. Scenario building can facilitate this policy development in a variety of ways. First, it can provide insights into key trends and driving forces determining the territorial development of the EU 27 and neighbouring countries. Secondly, it can develop insights into the structural difficulties and potentialities that these trends and driving forces may generate at a European, national, and regional level. Indeed, scenarios can effectively organise a variety of seemingly unrelated economic, technological, social and other information and translate it into a framework for action, as well as presenting a holistic and integrated set of images associated with how that future might evolve.

Thirdly, scenarios can explore alternative sectoral and structural policies at the EU and national levels together with their territorial impacts. This may enhance synergy and co-ordination of decisions relevant for the territorial development and cohesion of an enlarging EU. Fourthly, scenarios provide points of reference

for improved communication among the policymakers and stakeholders involved in sectoral and structural policies at the EU, the national, and the regional levels. In this respect it is important that the scenarios embody different (but comparable) images of the future. Policy-makers and stakeholders may refer to these images in order to communicate their expectations and their desires related to the trends and driving forces determining territorial development. In this way the scenarios may help in creating visionary discussions at the European level concerning the territorial structures of an enlarged EU. Finally, scenarios may provide policymakers and stakeholders involved in spatial planning with evidence to promote preferred sectoral and structural policies.

8.1.3 Specific Requirements in Relation to Communication, Consultation and Validation in ESPON 3.2

ESPON 3.2 requires a number of specific objectives to be met in relation to communication, consultation and validation throughout the project. These include the following requirements:

• To prepare the scenarios in a cyclical and dynamic process allowing the Monitoring Committee to take active part in the 'scenario team', where the scenarios are gradually developed and tested before the final results;
• To prepare and support a communication process exploring the scenarios at political level, that can improve the understanding of spatial development trends and issues of territorial cohesion within an enlarged EU. A communication strategy could include different elements from informal consultations to futuristic stories supported by cartographic illustrations.

These requirements are to be delivered in the ESPON 3.2 process at the following times:

April 2004 (First Interim Report):

• Recommendations for the next phase of the scenario process... [including] …first ideas on a communication strategy in order to involve the Monitoring Committee in an informal debate on prospective/trend scenarios and orientations.

• Proposed timetable for the next phase leading to the Second Interim Report including a communication plan involving in particular the ESPON Monitoring Committee.

March 2005 (Second Interim Report)

• Proposal on a communication strategy ensuring a relevant informal debate on prospective/trend scenarios and orientations.

• Proposed timetable and strategy for the next phase leading to the Third Interim Report including a communication plan involving in particular the ESPON Monitoring Committee and major stakeholders.

January 2006 (Third Interim Report)

• Progress report on the implementation of the communication strategy and proposal for further dialogue and information activities.

• Proposed timetable and strategy for the next phase leading to the Final Report including a communication plan involving in particular the ESPON Monitoring Committee and major stakeholders.

The remainder of this report considers the ways in which ESPON 3.2 could meet and operationalise these objectives.

8.1.4 A Cyclical Approach to Scenarios, Communication and Validation

The cyclical approach to scenario building outlined in the previous chapter suggests that the adoption of several cycles of design or 'building blocks' helps produce scenarios that are robust, rigorous, scientifically validated, and which offer a high degree of explanatory power. These building blocks are defined and examined in a cyclical way with each cycle making a movement from the present (basic analysis) via the long-term (prospective and proactive scenarios) to the short-term (policy recommendations) and from the concrete (basic analysis) via the abstract (prospective and proactive scenarios) to the concrete again (policy recommendations). In these cycles, the building blocks are loosely coupled with one another but they are not necessarily sequential. Some, for instance, may be worked out in parallel. By employing this cyclical process the TPG will develop and test the building blocks methodically. The cyclical process is useful in integrating the large amounts of knowledge and information that is necessary for scenario building by sketching the main lines of the scenarios and developing them. Adopting this cyclical approach also strengthens project communication and validation procedures given that it enables the Monitoring Committee, ESPON Contact Point network, other stakeholders and the TPG to build a common vision on the process and agreement of the results.

8.1.5 Communication, Consultation and Validation in Scenario Construction in ESPON 3.2

The process of communication, consultation and validation is crucial to understanding the role of different policy measures and packages in alternative futures. In ESPON 3.2, consultation and validation play an important role in every cycle of the scenario-building process. Moreover, the consultation and validation process is particularly linked to three areas of project activity that commence in May 2004 and continue until the termination of the project. These are:

- Qualitative analysis of trends and driving forces
- Scenario building and the elaboration of scenarios
- Policy recommendations for EU spatial policy

Consultation and validation activity integrated into and across these areas of project activity will allow for discussion of issues such as:

- the acceptability of different scenarios amongst scientific and policy experts
- the barriers and obstacles to specific policy measures and outcomes
- the robustness of different policy options under different possible futures

Communication and validation play an important role in developing scenarios. Often, scenarios deal with considerable complexity in a range of inter-related systems in which qualitative statements and assumptions are embedded. As such, the involvement of a variety of actors is important for developing coherent scenarios. Scientific and policy experts, such as members of the Monitoring Committee, the ECP and the INTERREG networks, will be invited to participate in scenario workshops, brainstorm sessions, system dynamics and other techniques for expert consultation. Moreover, meetings will be organised between the Monitoring Committee and the TPG. Furthermore, a series of round table meetings and individual expert interviews will be organised in order to validate the results of these techniques and the draft versions of the reports the TPG will produce. Two principles are important for the selection of a panel of 30 to 50 experts: (1) each expert holds a strategic position in EU, national or regional policy-making or in the scientific world and (2) all the experts together represent a great variety of perspectives on EU territory and cohesion. Additionally, experts should be:

- rather generalists than specialists (although a number of specialists will be needed)
- creative, communicative and highly motivated
- representative of different types of member states, sectors, disciplines, and aggregation levels (EU, national, regional)

By applying these principles the consultation stimulates a process of mutual learning between the members of the TPG on the one hand and the policy experts and scientific experts on the other hand. The process is also very important to enhance the quality and the usability of the scenarios.

The TPG also intends to establish 'political' support for the process of scenario construction. As such we suggest the creation of a 'political reference group'. The reference group should contain experts who understand the political and scientific worlds but who are not involved in ESPON. We will discuss our general outcomes with this group throughout the project, but particularly in the early stages of the project and before its completion.

The communication and validation process is also part of the dissemination strategy for the project as a whole. There are a number of aspects of ESPON 3.2 that are required to be communicated and validated. These include:

- the overall process – the cyclical approach to scenario construction
- the scenarios, trajectories and policy orientations
- the conclusions and policy recommendations.

The communication and validation of the cyclical process of scenario construction has the advantage of establishing consistency, providing expert information and helping to discover alternative approaches to scenario construction. The validation of the scenarios, trajectories and policy orientations is designed to explore in detail the utility and legitimacy of proposed scenarios and policies. It is at this stage that a wide range of stakeholders will be involved. In so doing, this validation process should help in building consensus around policy orientations and recommendations, reduce implementation difficulties, and help clarify differences in modes of understanding between different EU countries and regions.

However, the process of widening the scenario building exercise to a broader circle of participants takes considerable effort. One obstacle is convincing stakeholders to spend time on discussing what may be seen as long-term issues and questions. This is particularly the case with decision-makers that do not perceive themselves as being strongly involved in spatial and territorial development. Other trans-national scenario-based projects have also shown that the development of a common language for discussing key issues and policy measures across different European regions, different policy fields and different kinds of stakeholders is a challenging task (POSSUM, 1999). Equally, compared to the complexity of the issues involved, meetings with stakeholders will inevitably be short with only limited discussion time available. The communication and validation process should not therefore be conceived as a 'one-way' activity in which the project as a whole receives only external input for developing and improving scenarios. The process must also be considered as a 'dissemination activity' where results and outputs are fed back into the scenario construction process to produce further reflections and outputs.

a) Ensuring that consultation and validation mechanisms are activated and utilized

The aim of the communication strategy is to ensure that the consultation and validation mechanisms of the project are activated and utilized between the TPG partners and other relevant stakeholders, most notably the ESPON Monitoring Committee and ECP network. This consultation and validation process involves three key activities:

- the organisation and collection of data and information in process
- the dissemination of information
- the organisation of feedback and further dissemination of data and information.

b) Utilizing a range of mechanisms to ensure coordinated and continual consultation and validation

A key function of the strategy is to support the requirements outlined in the terms of reference to 'prepare and support a communication process… (and) …bring added value through dialogue'. To fulfill this function, the strategy suggests the utilization of a range of mechanisms to ensure coordinated and continual

consultation and validation. Among the stakeholders associated with the process of consultation, the ECP network plays a key role, as it is representative of national scientific communities. Its feedback is therefore highly significant in validating scenario development. A key objective of the strategy is to disseminate this feedback in order to enrich scenarios by reflecting the different national planning cultures and sensitivities within the ECP network. In particular, communication and validation process will involve a series of strategic scenario workshops with the ESPON monitoring committee and the ECP network and expert interviews in order to facilitate on-going dialogue over the knowledge produced by, and between, those involved in the project. It is planned that the panel of 30 to 50 experts will be in place by September 2004.

The variety of methods employed will be found in the content and organization of the workshops and other scenario activities. As an initial guide, the first activities designed to generate ideas for scenarios will use brainstorming. They may also be developed from a Delphi questionnaire exercise which could also be the basis of the project web-site. It is envisaged that morphological analysis will also be employed towards the beginning of the project. The scenario building stage will use SWOT to analyze key drivers identified[1]. Scenario elaboration will be achieved by using techniques such as mind mapping. The validation stage will make more use of expert opinion and develop cross-impact matrices. Throughout the project there will be an on-going web based discussion forum.

The validation and monitoring of ideas and recommendations on the appropriateness of scenarios and their policy paths and applications will be addressed through a series of scenario workshop meetings targeted at the Monitoring Committee, the ECP network and the panel of experts. This will allow for the preparation of scenarios in a 'cyclical and dynamic way…gradually developed and tested'. At this stage of the process the communication and validation plan will focus on the relevance of scenarios to different regions of the European Union in order to elaborate a distinctive and contrasting scenario base for a sustainable and enlarged EU with considerable variation in spatial development. This will be achieved through additional scenario workshop sessions to validate scenario building within specific regions of Europe, transnational spatial development scenarios (through INTERREG IIC, IIIB), and/or spatial visioning exercises for national and regional development.

Our intention is that the series of scenario workshops should:

- take half a day and consist of several parallel sessions.
- comment and elaborate on the outcomes of the previous workshops and provide the input for the next stage of meetings
- generate 'discussion scenarios', e.g. four or five reactive scenarios and four or five proactive scenarios
- elaborate the 'discussion scenarios' in a **qualitative** way, including story lines, maps, sketches, exemplary regions etc.
- discuss these scenarios with various expert and user groups and on the basis of that adapt them and elaborate them further
- combine the 'discussion scenarios' and select them so that we end up with a set of three or four more integrated scenarios
- further elaborate these scenarios in a **quantitative** way

c) Facilitating consultation, dialogue and dissemination through virtual and paper-based media.

The communication and validation strategy will also manage inputs to a discussion forum linked to the project web-site to ensure continuous dialogue and reflection on the consultation and validation mechanisms outlined above, and on the project overall. The ESPON knowledge and communication tool will also be utilized in this respect (see section 8.2).

The scenarios produced should be made available for a wide variety of outputs, primarily priorities and policy recommendations, but also sectoral and regional specific analyses following from the regional

[1] The results of projects 3.1 and 2.4.2 are of special interest here.

scenarios. We will need to discuss at a later date how outputs might be presented to different user audiences, how networks may be maintained, who should be responsible for dissemination and how this may be continued after the end of the project.

Prior to this, the evaluation of outputs is an important part of the process, it can be done by checking if the targets set at the beginning of the exercise were actually met (and whether they were the right objectives), and if milestones were achieved as planned. In addition, the evaluation of the outcomes can be made through interviews and/or an evaluation questionnaire. The actual form of outputs may then appear as tangible products, such as reports and workshops and other dissemination activities, or intangible products, including the development of new networks or new links in existing ones and the informal incorporation of results in strategic processes.

The issue of dissemination to the most appropriate users is obviously a key part of this process. To maximise the value of the exercise it should be recognised that the various outcomes may address different audiences. Conversely, different output formats may be suitable for different users. User groups may be defined by their orientation, for instance; social (policy makers, consumer associations), technology (universities, research organisations, industry), business (SMEs, chamber of commerce) and territorial vision (policy makers, territorial associations).

8.1.6 Consultation and Validation Programme for ESPON 3.2

The programme has been summarised in the form of a table to assist in the clarification of the purpose and details of each stage of the process. The relevance to each stage of the cyclical approach and to output, in terms of interim reports, is charted and the consultation methods to be employed outlined.

The programme is conditional on the following points:

- A cyclical scenario process: scenarios are gradually developed and tested.
- The Monitoring Committee will play an active role in the scenario process.
- One ESPON seminar will take place every 6 months.
- A series of workshops will be held between November 2004 – February 2005 related to the meetings of the ESPON Monitoring Committee, the ESPON Contact Point Network, the Committee of the Regions and the INTERREG networks.

Table 8. Consultation and Validation Programme.

Activity	Date	Forum	Purpose	Participants	Input/pre-event preparation	Outcome/ post-event reporting	Consultation techniques	Link to stages in cyclical approach	Link to Interim Reports
1	May 2004	ESPON meeting	Clarification of project objectives Initiation of preliminary scenario ideas	TPG, MC, ECP, other TPG's	Draft version of first interim report	Reports on: WS1 (NISR) WS2 (Nordregio) WS3 (IGEAT) WS4 (AETS) WS5 (CUDEM) [1]	Modified Delphi/ Brainstorming/ Smaller group discussion	Preliminary	
2	June 2004	TPG meeting	Establish a panel of experts[2] Generation of discussion scenarios A clear view of the work for the coming half year	TPG	Reports from activity 1		Discussion	Partner meeting	FIR
3	September 2004	Website	Delphi exercise 1st gen. scenarios	Panel of experts			Delphi	Stage 1: Generation of ideas for building blocks	
4	October 2004	ESPON Seminar General workshop	Developing ideas for building blocks 1st gen. scenarios	TPG, MC, ECP	Outcome of Delphi on activity 3	- Reactive scenarios - Pro-active scenarios - Policy recommendations	Mind-mapping/ brainstorming	Stage 2: Development of scenario storylines	
5	November 2004	TPG meeting	1st generation scenarios Preparation of the series of scenario workshops	TPG	Report from activity 4	Clear ideas for the 1st gen. scenarios	Discussion system dynamics	Partner meeting	
6	A series of workshops will be held between November 2004 – February 2005 related to the meetings of the ESPON Monitoring Committee, the ESPON Contact Point Network, the Committee of the Regions and the INTERREG networks.								
7	March/April 2005	ESPON Seminar General workshop			Reports from workshop meetings			Stage 3: Further development of trends, driving forces and policy impacts	SIR
8	September 2005	TPG meeting	2nd gen. Scenarios	TPG	Report from activity 7	Clear ideas for 2nd gen. scenarios	Discussion	Partner meeting	
9	October 2005	ESPON Seminar	3rd gen. scenarios	TPG, MC, ECP	Report from activity 8	Clear ideas for 3rd gen. scenarios	Discussion		
10	January 2006	TPG meeting		TPG	Report from activity 9	Policy recommendations	Discussion	Stage 4: Trend analyses extrapolated	TIR
11	June 2006	TPG meeting		TPG	Report from activity 10				TIR

[1] Workshop 1 An effective and efficient consultation and validation process, WS2 Probable/possible/(un)desirable futures, WS3 Driving forces and wildcards, WS4 Possibilities of extending the existing data in time/data requirements, WS5 Definition of policy goals and governance of EU projects in different areas

[2] A panel of 30-50 scientific and policy experts, including TPG, MC, ECP, Interreg

8.2 Prototype of Knowledge and Communication (K+C) tool

8.2.1 Concept

The **Knowledge and Communication Tool** (K+C) aims to continue the scientific guidance within the ESPON programme and the further development of innovative ESPON tools according to the ESPON 3.2 terms of reference. K+C is a service-oriented tool based on advanced technology for both ESPON 3.2 and the larger ESPON Community.

Building on the results of the ESPON 3.1 policy-approach, a very first version of the K+C tool is currently available for consultation at http://www.mcrit.com/espon_scenarios (provisional portal). The K+C aims to become a scenarios knowledge-base for policy support on the Internet, identifying and harmonising state-of-the-art references concerning spatial scenarios, trends and sectoral policies in Europe and other parts of the world. So far, the website contains a preliminary selection of existing trends, national and European scenarios and information on relevant software and modelling resources.

First results of the preliminary assessment of data and scenarios, syntheses of strategic policy-impact studies and other documents from ongoing ESPON 3.2 works will be introduced gradually following the First Interim Report. Moreover, user-friendly tools for data and indicator retrieval and graphic and desktop mapping visualisation will be developed later on. This interactive graphing and mapping tool may serve as a basis for the on-line representation of scenarios.

Much of the work of the different tasks of this project is related or complementary, so that the K+C tool is a useful mechanism to stimulate the continued interaction and scientific coherence of the TPG work. Partners

will submit interesting material so that the knowledge-base becomes a true reference for WPs working on scenario building and forecast models. Ultimately, the ESPON virtual knowledge-base constitutes an effective and innovative communication tool; and will no doubt reinforce the scientific integrity and consistency of the 3.2 co-ordinating and territorial cross-thematic project, and the ESPON initiative as a whole.

In co-operation with other partners, a first attempt to define a common glossary of basic concepts has been produced although definitions are still under discussion. Some such terms are:

- Goals
- Policies
- Proactive or normative scenarios
- Prospective or Business-as-usual scenarios
- Scenario analysis
- Trends
- Trend analysis
- Unthinkable scenarios
- Visions development

8.2.2 Functioning

The Scenarios K+C portal is being developed by ESPON 3.2. Within ESPON 3.2, MCRIT is the partner responsible for the development and maintenance of the portal. All partners are responsible for its content.

The material included in the scenarios K+C portal so far has been classified into four different sections:

1. Spatial Visions

    - European
    - National
    - Regional

2. Sectorial Visions

    - Demography
    - Environment
    - Economics
    - Transport
    - Others

3. Trends

    - Prospective Institutions
    - Key documents
    - Hotspots

4. Modelling Resources

    - Software
    - Methodology
    - Papers on modelling

8.3 Report on strategy for transition of ESPON scientific coordination

The main aim of the scientific coordination of the ESPON platform is to create a coherence within the ESPON results in order to avoid individual, independent studies, without any linkage between them. Up to now the effort has been on shaping of common methodologies, common indicators and typologies as well as on a practical level in terms of data and presentation. However, the task of ensuring scientific coherence and networking has to be further developed and deepened. An effort is needed to structure all the results in order to combine the cross-thematic research results, thus delivering practical and comprehensible, integrated results for policy making. This should be done by combining the results of the individual projects into common analyses and reports.

The scientific coordination will also include an active role of guiding ongoing projects and the additional 8-10 new projects envisaged. One element will be to follow the tradition of the so-called 'guidance papers' which are published after each ESPON seminar. The first guidance paper 3.2 will be involved in would, therefore, be the Nijmegen Guidance paper.

In concrete terms the task of scientific coordination should contain the following elements:

• integration of the available data and results into combined, comprehensive territorial indicators (without falling into the trap of 'one indicator that says it all')

The 'coordination' of research efforts also includes their synthesis. This is the aim of the integrative tools such as the ETCI and the MASST model (and of the metamodels to be introduced at a later stage). The typology of European regions proposed in section 4.2 is another element of this synthesis. Obviously, we will base our work on the achievements of project 3.1 in this matter.

• inclusion of the other TPGs into the scenario validation process (ESPON seminars)

One of the main parts of the scenario building process it the validation of the different draft scenarios by experts. Many of the relevant experts are in different ESPON TPGs and we will thus ensure regular opportunities for them to interact with us. The first example of such interaction is the workshop session at Lillehammer, and further examples of this are developed in section 8.1.3 (consultation & validation).

• an extensive use of communication / networking (internet) in order to create greater interdisciplinary exchange between TPGs

The specific demands of project 3.2 of developing a synthetic view of the results of the ESPON programme will make it necessary to ask the other TPGs to validate our work, and, in some cases, participate in discussions concerning certain topics.

The K&C tool (section 8.2) will be a central part of this effort, making our findings available to all the ESPON programme, thus, hopefully, provoking a stimulating debate on the issues.

Once in place the ESPON 3.2 intranet will include the possibility of inviting persons from outside the TPG to specific virtual discussion and working groups. This will also allow other TPGs to take part in some discussions concerning their specialties.

• guidance of new projects / support in definition of terms of reference

The following new projects are foreseen within the next year:

• currently in the tendering process: 2.3.1 (ESDP impacts), 2.3.2 (Governance), 2.1.5 (Fisheries policies), 3.3 (Lisbon process), 1.3.3 (The role and spatial effects of cultural heritage and identity), 2.4.2 (Integrated analysis of transnational and national territories based on ESPON results), 3.4.1 (Europe in the World)

• tendering process to be launched in January 2005: 1.2.3 (Information society), New additional projects

We will assist in the scientific guidance of these projects and help them integrate the ESPON framework smoothly. We will especially insist on using the experience of the current projects to ensure a clearer focus on the ESPON goals. Projects 2.3.1, 2.3.2, 2.4.2 and 3.4.1 are actually directly linked to the scenario building process and networking between them and project 3.2 is, therefore, of prime importance.

• the inclusion of the ECP network in the research process and the use of its already existing scientific evaluations into the effort of distilling the existing results into a common framework of research

The ECP network provides a unique opportunity to reach national research communities in spatial planning. Additionnally, it has recently been boosted in order to allow it a more proactive role in research. Part of the scientific coordination of ESPON will be to profit of this network, both for the actual research done in project 3.2 (and in other projects), but also to prepare recommendations for the post-2006 period in terms of potential research activities on a European level.

The ECP network has also engaged in the process of scientifically evaluating the work done by the different TPGs. This will be a very important resource for the task of scientific coordination.

• guidance and cooperation with TPGs on further development and deepening of a common scientific platform for the ESPON programme

The IGEAT will cooperate closely with the BBR in preparation of the Nijmegen seminar. This preparation period will at the same time allow the learning process and transfer of knowledge necessary for a smooth transition.

• close cooperation with the ESPON CU / the ESPON management level

During the transition period, the representatives of project 3.2 (IGEAT and/or AETS) will participate in all coordination meetings with the CU and the BBR.

9 Annexes

9.1 Annex I : Principles for databases integration and quality control

FOREWORD

This paper elaborated by C. Grasland and H. Mathian in the framework of ESPON 3.1 proposed some principles which could be introduced in the structure of the ESPON database in a long term perspective. Those principles are derived from previous experiments of the elaboration of European databases in a research network (EUROSCOPE). The ideas proposed in this working paper have not been adopted in the framework of ESPON 3.1 because they appeared to be too difficult for an implementation in the short term.

INTRODUCTION

One prior task of the TPG ESPON 3.1 is the integration of databases received from the data navigator and the other TPGs in a coherent data structure. The previous experiments of many European research projects indicate clearly that the quality of the databases is much more important than the quantity of information. It has been proved many times at European level that a small database perfectly integrated is much more useful and efficient than a wide database which is a simple compilation of heterogeneous indicators established without any rules of quality control. In this section we will discuss the basic principles of quality control that we propose to follow in TPG 3.1 for a good integration of the future ESPON databases.

9.1.1 Precise identification of initial information sources

The precise identification of the initial sources of information (census data, survey,?) is an absolute necessity for the quality control of information. In every case, it should be possible to identify the path of elaboration of any figure of the ESPON database, from initial to derived sources of information. All transformations or modifications of primary sources should be clearly identified and registered when secondary sources are introduced in the ESPON database.
For example, the SIRE database from Eurostat is a secondary source, which is a compilation of national census at local level. In this case, a precise identification of sources would imply the storage of the references of all national statistical institutes responsible from the production of census data and the precise time of those censuses. In the example of the SIRE database, this work of documentation has yet been done by Eurostat and it is sufficient to indicate the reference of the SIRE reference guide where all those precisions are available. But in other cases, databases are tertiary sources where it is not necessary easy to evaluate the path toward original sources of information.
In our opinion, the ESPON database should not introduce any information without a clear identification of the original sources.

9.1.2 Storage of Kernel information

In many cases, the indicators used for territorial planning are a mathematical combination (addition, subtraction, division, multiplication,?) of basic variables which are not directly useful but are, in practice, the kernel information from which all indicators are directly or indirectly derived. A good database structure should absolutely store those kernel variables (real information) and not necessarily store the derived indicators (virtual information) which can be automatically computed when request.
In a short term perspective, this principle can appear a little difficult as far as it implies that if we want to use a variable like for instance the median age of population in NUTS3 regions, we are obliged (1) to store all the age structure of those NUTS3 regions and (2) to store the formula of median age computation in a SGBD. Apparently this solution will waste a lot of time and human resource, but in fact it produces a very important gain of time, resources and quality in a long term perspective because: The spatial aggregation or

disaggregation of data is much more easy: in the case of median age, it is impossible to estimate the values at NUTS2 level if we have stored only the median age at NUTS3 level, even if the calculus is weighted by population (it would be possible with the average age of population, but not with the median one). But it is very easy to aggregate all classes of age (which are count variables) from Nuts3 to Nuts2 and then to apply the formula of median age computation which has been stored for Nuts3 and remain available at Nuts2. Many indicators are derived from the same kernel variables: which means that with a limited number of good elementary variables, it is possible to produce a very wide set (probably infinite) of indicators and derived variables. And the fact to store kernel variables can favour the production of new indicators which would not be possible if that kernel information had not been stored. Imagine for example that a TPG has produced the indicators Z1=(A/B) and another TPG the indicator Z2 = (C-D)/E, the strategy of kernel indicators (storage of A,B,C,D,E) make possible the construction of many other indexes like (C-D)/B or A/E which would not have been possible if we had only stored the indexes Z1 and Z2. Statistical tests are generally not available or biased if the kernel information is not available in the database structure: in the very simple example of GDP/inh., a good statistical evaluation of heterogeneity can not be made by a simple comparison of regional ratios but imply a direct examination of the unequal repartition of the raw values of population and wealth. Generally speaking, the use of ratio is very dangerous in statistical analysis because results are unweighted and subject to random variations in small areas. The fact to keep the initial count variables from which ratio are derived is the necessary condition for a correction of those biases.

9.1.3 Storage of all procedures of interpolation used for European temporal harmonisation of databases

In the European context, especially if we take into account the enlargement of databases to accessing countries, it is not possible to use primary sources without modifications and harmonisation. The simplest example is related to the census year and date which are different in most European states. Thus, if we want to evaluate the regional distribution of population on 1st January 1990 or 2000 for all European regions, we will be necessarily obliged to introduce estimations for all states which have a different census time. Those estimations are not a problem as far as the estimation procedure is clearly indicated in the database structure (Cf. 1).

An ideal situation would be the storage of data and formulas used in order to produce harmonised kernel information derived from primary kernel information. For example, if we want to evaluate the population of French regions in 1980, starting from the census variables of 1975 and 1982, we should store (1) the regional populations of France in 1975 and 1982 (primary kernel information) and (2) the precise formula used for the estimation (linear, exponential...) of population in 1980 from population in 1975 and 1982.

It is necessary to keep in mind that those rules apply only to kernel information and are not necessary for indicators which are derived from combination of kernel variables. If we take the example of a regional index of median age of population in France in 1980, the database should indicate that it is the result of a formula applied to age structure in 1980, which is derived from a formula of interpolation derived from age structure in 1975 and 1982.

9.1.4 Storage of all aggregation/dis-aggregation procedures used for territorial harmonisation of databases

Another crucial problem is related to the harmonisation of European territorial divisions, which is not only a technical problem but also a political problem, as far as the attribution of structural funds is related to particular values (thresholds) established at a particular level of territorial division. Practices of 'gerrymandering' or simple evolution of regional divisions are responsible of a very difficult problem in the establishment of long term time-series at regional level. The users of REGIO or SIRE databases are always obliged to face gaps, discontinuities and breakdowns in regional time series, which imply a very dangerous lack of efficiency in the production of study on trends at European level.

It is thus necessary to distinguish between *official maps at a given time t*, which are obliged to use the official delimitation of the period t, and *trend maps on a long period T,* which cannot use official delimitations because of regular changes in the official delineation of political and administrative boundaries. Taking into account the strategic objective of the ESPON Programme, it is necessary to distinguish between *present time indicators* which will use the official territorial definition in use at the moment of the

programme and 'long time series indicators' which will use another territorial delimitation and introduce processes of aggregation/dis-aggregation in order to produce harmonised time series.
As in the case of time harmonisation (Cf. 3), those processes of territorial estimations should be stored very precisely in the ESPON database, as far as they are many solutions for territorial harmonisation, especially depending on the ancillary variables which are used (see. Study for EUROSTAT-GISCO, realised by Briggs & al.).

9.1.5 Identification of possible biases related to thematic harmonisation and storage of corrections eventually introduced

In addition to the problems related to temporal and spatial harmonisation of European databases, it is necessary to focus on the problems related to the harmonisation of definitions used in the European states and the possible biases introduced by differences in the definition of variables and collection of information when those biases are known.
A classic example of those biases is related to the measure of infant mortality rate. Apparently, this index is based on a very precise definition (ratio between death between 0-1 year and the total number of births), but in fact many problems of harmonisation are revealed by demographers. In certain states, for example, the children who die during their 1st day of existence are not recognised as 'born' (and thus, neither as 'dead between 0 and 1'). Accordingly, they are classified as 'stillborn' and not taken into account in the computation of the infant mortality rate, which introduces an important reduction of the ratio, as compared to other states.
In the case of ESPON, we have to be very careful about those possible biases and it should be important to store in the databases the possible biases related to a lack of harmonisation in definition or statistical system practices when those biases are established by experts. The researchers of the different TPGs will probably indicate those biases in their reports and an important work of the transversal TPG ESPON 3.1 is to store those experts' advices in the ESPON database. For many crucial subjects (unemployment, R & D, accessibility...) this precise criticism of indexes is, in a sense, more important than the value of indexes stored in the database and represents the real added value of the ESPON Programme. When new indicators are produced by a TPG (e.g. evaluation of cultural resource from tourist guides quotation; evaluation of spatial integration by number of twinning towns), it is the responsibility of the ESPON 3.1 to request a precise discussion of the harmonisation procedure and criticism of bias, before adding the variable in the ESPON database. The TPG 3.1 has no power of 'censure' on the work of other TPGs, but should have the right to obtain full explanations on the origin of indexes before introducing them in the ESPON database.

9.1.6 An open and evolutive database

According to the previous principles, we expect to propose an open and evolutive database which will probably be limited in a first step, but can be further developed geographically, historically and thematically in order to produce a cumulative knowledge on European Spatial Development.
An open database means that all researchers involved in the ESPON Programme will contribute to its achievement (as data providers or experts) and that, conversely, all researchers involved in the ESPON Programme will have the right to use this database for the purpose of the programme. This interactive open access of all ESPON research members to the ESPON database is technically complicated (problems of security) but is, in our opinion, a guarantee of quality of the results as far as all indexes involved in the ESPON database will be subject to the collective evaluation by a community of more than 200 researchers from all the EU and accessing countries. This practice of open and shared database system was introduced (by the BBR) in the 'synthetic experiment' of the SPESP and appeared very fruitful because many researches were developed on the indexes collected by the SPESP after the end of this programme and other dissemination of results to a wider public was made possible (e.g. interactive Atlas produce by MCRIT for the teaching of the geography of Europe).

An evolutive database means that the structure which is conceived for the elaboration of the database is not bounded by the more urgent requests addressed to the ESPON programme by members states and European Commission. The adding of new countries (not actually accessing) should be possible without major changes in the database structure and the actualisation of the time series after the publications of the results of new

census should also be implemented as a necessary condition in the definition of the database structure. Conversely, the reconstitution of older distributions in the past should also be taken into account, as far as the availability of precision is generally related to a good knowledge of past trends: we cannot produce serious previsions for Europe 2020 or 2050 without any precise reconstitution of evolutions since at least 1960.

9.2 Annex II : Methodology used for the experiments on ETCI

Objectives of the experiment:

The object of this experiment was the creation of a composite index with variations between 0 and 1 which is derived from a weighted mean of partial indexes which are also defined between 0 and 1.

Database:

The experiment has been realised on the statistical annex of the 2nd Cohesion Report which has been completed by estimation for missing values.

Methodology:

Standardisation of variables between 0 and 1

Each variable *i* has been transformed in a standardised variable V* with variation between 0 and 1. They are many solution for such a transformation. We have chosen here another solution which is based on *cumulative frequency of regional population of regions ranked by order of the target criteria* (1)

$$V^*_i = \frac{\frac{1}{2}P_i + \sum_{V_j<V_i} P_j}{\sum P_j}$$

For example, the standardised value of GDP/inh. for the Spanish region of Alentejo is *0.26*, which means that the regions with a GDP/inh. lower than Alentejo represent 26% of the total population of Europe. The value of Ile-de-France is 0.96 because the regions with higher GDP/inh. Represent only 4% of the European population. In the particular case of V3 (*unemployement*), we have used the inverse order because we consider this criterion as negative for European Cohesion.

Combination of standardised variables into a single index

Once we have obtained a table with standardised values for each interesting criteria, we can examine different formulas for the combinations of criteria into a single European Territorial Cohesion Index. In a first step, the variables are chosen as simple as possible and the weights are supposed to be equal. When a variable (X) is supposed to have negative a effect, like unemployment, we use the variable (1-X), which is also bounded between 0 and 1. According to policy recommendations, we can propose two different formulas.

ETCI n°1 ('ESDP oriented') is based on the three goals of European Spatial Development Perspective and tries to choose one variable for the illustration of each of those dimensions:

- *Economic competitiveness* => GDPPS99 = GDP/inh. (SPA) 1998
- *Social Cohesion* = > UNTOT99 = Unemployment rate (%), Total, 1999
- *Sustainable Development* => POYOU99 = % of population aged under 15 (1998)

ETCI n°2 ('Lisbon oriented') is based on the factors of future competitiveness of Europe in the world which depend on GDP/inh. as previously but are more connected with post industrial activities and level of education.

- *Economic competitiveness* => GDPPS99 = GDP/inh. (SPA) 1998
- *Post industrial activities* = > ACSER99 = Employment in services (% of total), 1999
- *Human capital* => EDHIG99 Educational attainment High (% of 25-29), 1999

9.3 Annex III : List of ESPON-Database indicators (status: 23.03.2004)

Theme	Subtheme	Indicator	Description	Time reference	Regional reference	Project	Contact person
01 Spatial typologies	**011 Functional region**						
	012 Spatial classification	Pentagon-area			NUTS 2, NUTS 3	2.1.1/3.1	Spangenberg, M./Schmidt-Seiwert,V./Heidbrink,I.
		Typology Settlement Structure	Six basic types defined by population density and situation regarding centres		NUTS 2, NUTS 3	3.1	Schmidt-Seiwert,V.
		Typology polycentricity			NUTS 3	1.1.1.	Anne Antikainen
		Typology urban-rural population			NUTS 3	1.1.2	Jörg Neubauer
		Typlogy Functional urban areas			NUTS 5	1.1.1.	Anne Antikainen
	013 City System						
	014 Eligible Areas	Interreg-Reference	Part of Interreg-Programme		NUTS 3	3.1	Schmidt-Seiwert, V.
		Objective 1 / Objective 2 - regions			NUTS 2, NUTS 3	2.1.1/3.1	Spangenberg, M./Schmidt-Seiwert,V./Heidbrink,I.
02 Population	**021 Population Structure**	Average Population by sex		1995-1999	NUTS 3	3.1	J. Bublys/V. Schmidt-Seiwert
		Fertility rate		1990, 1995, 1999	NUTS 1, NUTS 2, NUTS 3	1.1.4.	Daniel Rauhut/Mats Johansson
		Labour force	Pop aged between 55-64 / Pop aged between 20-64	2000	NUTS 2	1.1.4.	Daniel Rauhut/Mats Johansson
		Labour force replacement	Pop aged between 10-19 / Pop aged between 55-64	2000	NUTS 2	1.1.4.	Daniel Rauhut/Mats Johansson
		Dependency rate	total population in relation to the population in the ages between 20-64- is a function of the size of the young age groups (0-19) and the older age groups (65+)	1995, 1999	NUTS 1, NUTS 2,	1.1.4.	Daniel Rauhut/Mats Johansson

Theme	Subtheme	Indicator	Description	Time reference	Regional reference	Project	Contact person
		Post-Active Dependency	Pop aged over 65+/Pop aged between 20-64	2000	NUTS 2	1.1.4.	Daniel Rauhut/Mats Johansson
		Changes in Natural Growth Potential	Pop aged between 20-29 in 2020 (born 1991-2000)/Pop aged between 20-29 in 2000 (born 1971-1980)	2000-2020	NUTS 2	1.1.4.	Daniel Rauhut/Mats Johansson
		Aged People vs.Youth	Pop aged over 65+/Pop aged between 15-24	2000	NUTS 2	1.1.4.	Daniel Rauhut/Mats Johansson
		Share of children	Pop aged betwen 0-14/Tot.pop	2000	NUTS 2	1.1.4.	Daniel Rauhut/Mats Johansson
		Ageing Population	POP aged over 65+/POP Tot	2000	NUTS 2	1.1.4.	Daniel Rauhut/Mats Johansson
		Ageing Population	POP aged over 65+/POP Tot	1990,1995,1999	NUTS 2, NUTS 3	1.1.4.	Daniel Rauhut/Mats Johansson
		Population by agegroups & sex		1995-2000	NUTS 2	3.1	J. Bublys/V. Schmidt-Seiwert
		Population by educational level, agegroups & sex		1999-2002	NUTS 2	3.1	J. Bublys/V. Schmidt-Seiwert
		Population denstity		1995-2000	NUTS 0, NUTS 1, NUTS 2, NUTS 3	2.1.2.	
		Population by tertiary education	Percentage of total population with tertiary education	1994-2001	NUTS 0, NUTS 1, NUTS 2, NUTS 3	2.1.2.	
	022 Population Movement	Population change		1995-1999	NUTS 2	1.1.4.	Daniel Rauhut/Mats Johansson
		Population change, typology	Six typologies with regard to total population change, naturale population and net migration 1996-1999	1996-1999	NUTS 2, NUTS 3	1.1.4.	Daniel Rauhut/Mats Johansson

Theme	Subtheme	Indicator	Description	Time reference	Regional reference	Project	Contact person
		Population change of ageing population by Net-migration and natural development	Total population development - only Regions with a high share (18% or more) of the population in the ages 65+ year 1999	1996-1999	NUTS 2	1.1.4.	Daniel Rauhut/Mats Johansson
		Population change of ageing population by migratory and by natural change, typology	Typologies with regard to total population change, naturale population and net migration 1996-1999 - only Regions with a high share (18% or more) of the population in the ages 65+ year 1999	1996-1999	NUTS 2	1.1.4.	Daniel Rauhut/Mats Johansson
		population change per 1000 inhabitants by natural change and by migratory	Total population change per 1000 inhabitants between 1996 and 1999	1996-1999	NUTS 2	1.1.4.	Daniel Rauhut/Mats Johansson
		population change per 1000 inhabitants by natural change and by migratory, typology	Total population change per 1000 inhabitants between 1996 and 1999	1996-1999	NUTS 2	1.1.4.	Daniel Rauhut/Mats Johansson
03 Employment and Labour Market	**023 Households 031 Employment and sector structure**	Active population by sex & <25		1995-2001	NUTS 2, NUTS 3	3.1	J. Bublys/V. Schmidt-Seiwert
		Average workhours by economic activity		2001,2002	NUTS 2	3.1	J. Bublys/V. Schmidt-Seiwert
		Employed persons by economic activity		1999-2002	NUTS 2	3.1	J. Bublys/V. Schmidt-Seiwert
		Medium-high and high-tech manufacturing (employment as % of total manufacturing employment)		1995-2000	NUTS 0, NUTS 1, NUTS 2, NUTS 3	2.1.2.	

Theme	Subtheme	Indicator	Description	Time reference	Regional reference	Project	Contact person
	032 Structure of persons employed	Employed persons by sectors and sex		1995-2001	NUTS 2	3.1	J. Bublys/V. Schmidt-Seiwert
		Employed persons by nationality and agegroups		1999-2002	NUTS2	3.1	J. Bublys/V. Schmidt-Seiwert
		Employed persons by occupation and sex		1999-2002	NUTS2	3.1	J. Bublys/V. Schmidt-Seiwert
		Employed persons by professional status and sex		1999-2002	NUTS2	3.1	J. Bublys/V. Schmidt-Seiwert
		Labour status by agegroups & sex		1999-2002	NUTS2	3.1	J. Bublys/V. Schmidt-Seiwert
	033 Unemployment	Unemployed persons by sex & <25		1998-2001	NUTS 2, NUTS 3	3.1	J. Bublys/V. Schmidt-Seiwert
		Unemployment rate by sex & <25		1998-2001	NUTS 2, NUTS 3	3.1	J. Bublys/V. Schmidt-Seiwert
		Unemployment rate		1995-2001	NUTS 0, NUTS 1, NUTS 2, NUTS 3	3.1	J. Bublys/V. Schmidt-Seiwert
04 Wealth and production	**041 National accounts**						
	042 Income and consumption	GDP in Mill of Euro		1995-2000	NUTS 0, NUTS 1, NUTS 2, NUTS 3	3.1	J. Bublys/V. Schmidt-Seiwert
		GDP - Euro per inhabitant		1995-2000	NUTS 0, NUTS 1, NUTS 2, NUTS 3	3.1	J. Bublys/V. Schmidt-Seiwert
		GDP by Population, 'euros per inhabitant		1999	NUTS 2	3.1	J. Bublys/V. Schmidt-Seiwert
		GDP Millionen EURO		1999	NUTS 2	3.1	J. Bublys/V. Schmidt-Seiwert
		GDP Millionen Purchasing Power Standards		1999	NUTS 2	3.1	J. Bublys/V. Schmidt-Seiwert
		GDP Purchasing Power Standards per inhabitant		1999	NUTS 2	3.1	J. Bublys/V. Schmidt-Seiwert

Theme	Subtheme	Indicator	Description	Time reference	Regional reference	Project	Contact person
		GDP Purchasing Power Standards per inhabitant in EU average		1999	NUTS 2	3.1	J. Bublys/V. Schmidt-Seiwert
		GDP Euro per inhabitant		1999	NUTS 2	3.1	J. Bublys/V. Schmidt-Seiwert
		GDP Euro per inhabitant in EU average		1999	NUTS 2	3.1	J. Bublys/V. Schmidt-Seiwert
	043 Production						
	044 Trade						
05 Enterprises and Investments	**051 Enterprise Structure**						
	052 Sectoral structure						
	053 Turnover, Investments						
06 Transport	**061 Transport infrastructure**	Number of commercial airports		2001	NUTS 3	1.2.1	A. Ulied/M. Font
		Number of commercial airports (more than 15 millions of passenger/year)		2001	NUTS 3	1.2.1	A. Ulied/M. Font
		Number of commercial airports (15 millions of passenger/year)		2001	NUTS 3	1.2.1	A. Ulied/M. Font
		Number of commercial airports (more than 5 millions of passenger/year)		2001	NUTS 3	1.2.1	A. Ulied/M. Font
		Number of commercial airports (more than 1 millions of passenger/year)		2001	NUTS 3	1.2.1	A. Ulied/M. Font
		Number of commercial airports (more than 0,5 millions of passenger/year)		2001	NUTS 3	1.2.1	A. Ulied/M. Font
		Traffic in commercial airports (in million passengers/year 2000)		2001	NUTS 3	1.2.1	A. Ulied/M. Font

Theme	Subtheme	Indicator	Description	Time reference	Regional reference	Project	Contact person
		Traffic in commercial airports (in million passengers/year 2000)/inhabitants (1999)		2001	NUTS 3	1.2.1	A. Ulied/M. Font
		Number of commercial seaports		2001	NUTS 3	1.2.1	A. Ulied/M. Font
		Number of commercial airports (more than 10 millions of tonnes/year)		2001	NUTS 3	1.2.1	A. Ulied/M. Font
		Number of commercial airports (10 millions of tonnes/year)		2001	NUTS 3	1.2.1	A. Ulied/M. Font
		Number of commercial airports (1 millions of tonnes/year)		2001	NUTS 3	1.2.1	A. Ulied/M. Font
		Number of commercial airports (0,5 millions of tonnes/year)		2001	NUTS 3	1.2.1	A. Ulied/M. Font
		Traffic in commercial seaports (in million tonnes/year 2000)		2001	NUTS 3	1.2.1	A. Ulied/M. Font
		Length of railway network (2001)		2001	NUTS 3	1.2.1	A. Ulied/M. Font
		Number of rail stations serving high speed rail lines		2001	NUTS 3	1.2.1	A. Ulied/M. Font
		Length of high speed rail lines (km)		2001	NUTS 3	1.2.1	A. Ulied/M. Font
		Length of high speed and main rail lines (km)		2001	NUTS 3	1.2.1	A. Ulied/M. Font
		Length of road network (km		2001	NUTS 3	1.2.1	A. Ulied/M. Font
		Length of highroad network (km)		2001	NUTS 3	1.2.1	A. Ulied/M. Font

Theme	Subtheme	Indicator	Description	Time reference	Regional reference	Project	Contact person
	062 Passengers and goods transport	Total trips generated in each NUTS2, by purpose, by means of travel		2001	NUTS 2	1.2.1	A. Ulied/M. Font
		km per person in trip by purpose, generated in each NUTS2, by means of travel		2001	NUTS 2	1.2.1	A. Ulied/M. Font
		Travel time (minutes) to the nearest commercial seaport	by car of the capital or centroid representative of the NUTS3	2001	NUTS 3	1.2.1	A. Ulied/M. Font
		Connectivity to commercial airports / seaports	by car of the capital or centroid representative of the NUTS3 (HOURS)	2001	NUTS 3	1.2.1	A. Ulied/M. Font
		Time (hours/minutes) to the nearest motorway access,	by car of the capital or centroid representative of the NUTS3	2001	NUTS 3	1.2.1	A. Ulied/M. Font
		Connectivity to transport terminals by car (hours/minutes)	of the capital or centroid representative of the NUTS3	2001	NUTS 3	1.2.1	A. Ulied/M. Font
	063 Vehicle Stock						
	064 Travel to work						
	065 Safety						
	066 Accessibility	Population accessibility	Daily population accessible by car	1999	NUTS 3	1.2.1	A. Ulied/M. Font
		Potential accessibility multimodal, destinations=EU12 / EU15	Model ouput	2001	NUTS 3	1.1.3	Spiekermann, K.
		Accessibility time to market by rail, by road, by rail & road		1997	NUTS 3	2.1.1	Schneekloth, N.
		Typology Multimodal Accessibility Potential	Based on a time based, multimodal accessibility-indicator,	2001	NUTS 2, NUTS 3	2.1.1	Spangenberg, M.

Theme	Subtheme	Indicator	Description	Time reference	Regional reference	Project	Contact person
	067 Impacts of transport policys / scenarios	Effects polycentric development	SASI, CGE, STIMA		NUTS 2	2.1.1	Lundqvist,Lars
		Impacts of scenarios on growth-rates of GDP, accessibility, internet	ICT-Policyscenario	2020	NUTS 2	2.1.1	R.Capello/A.Spairani
		Impact of scenarios on regional welfare (GDP)		1991-2001, 2001-2021	NUTS 3	2.1.1	Schneekloth,N./Bröcker,J.
		SASI-model (GDP/capita)		1991-2001, 2001-2021	NUTS 3	2.1.1	Wegener,M./Spiekermann,K.
		Differences from the EU mean in per capita GDP growth rate in the different scenarios			NUTS 2	2.1.1	Alessia Spairani
07 Research and Development	**071 Invention and Innovation**	High-tech patents	Total number of applications	1995-2000	NUTS 0, NUTS 1, NUTS 2, NUTS 3	2.1.2.	
	072 Facilities and Employment						
	073 Finance and Expenditures	Research & Development Expenditures, by sectors, in Millions of Euro	sectors: business, government, higher education, private non profit sector	1995-2002	NUTS 0, NUTS 1, NUTS 2, NUTS 3	2.1.2.	
08 Utilities	**081 Energy production**						
	082 Energy consumption						
	083 Waste disposal						
	084 Water						
09 Communication technology	**091 Infrastructure, supply**	Telephone subscribers per 100 inhabitants		2001	NUTS 0	1.2.2	CURDS
		Internet users per 10.000 inhabitants		2001	NUTS 0	1.2.2	CURDS

Theme	Subtheme	Indicator	Description	Time reference	Regional reference	Project	Contact person
		Estimated PC per 100 inhabitants		2001	NUTS 0	1.2.2	CURDS
		Largest city teledensity		2001	NUTS 0	1.2.2	CURDS
		Rest of country teledensity,		2001	NUTS 0	1.2.2	CURDS
		Overall country teledensity,		2001	NUTS 0	1.2.2	CURDS
		Residential_main_lines_per_100_households_		2001	NUTS 0	1.2.2	CURDS
		New_telephone_lines_added_2000_01_CAGR_in_percent		2001	NUTS 0	1.2.2	CURDS
		New_mobile_subscribers_added_2000_01_CAGR_in_percent		2001	NUTS 0	1.2.2	CURDS
		New_Internet_hosts_added_2000_01_CAGR_in_percent		2001	NUTS 0	1.2.2	CURDS
		Proportion_of_households_subscribing_to_Cable_TV		2001	NUTS 0	1.2.2	CURDS
		Main_telephone_lines_per_100_inhabitants		2001	NUTS 0	1.2.2	CURDS
		Main_telephone_lines_CAGR_in_percent		2001	NUTS 0	1.2.2	CURDS
		Share_of_main_lines_connected_to_digital_exchanges		2001	NUTS 0	1.2.2	CURDS
		Cellular_subscribers_per_100_inhabitants		2001	NUTS 0	1.2.2	CURDS
		Share_of_Broadband_penetration_to_population		2002	NUTS 0	1.2.2	CURDS
		Share_of_Internet_users_to 100_inhabs_regression		2002	NUTS 0	1.2.2	CURDS
		Proportion_of_firms_with_own_website_regression		2003	NUTS 0	1.2.2	CURDS
	092 Access, use						

Theme	Subtheme	Indicator	Description	Time reference	Regional reference	Project	Contact person
10 Household oriented Infrastructure							
	101 Healthcare						
	102 Education						
	103 Amenities						
11 Land Use	**111 Natural resources**	Coast/Border			NUTS 2, NUTS 3	2.1.1	Spangenberg,M./Heidbrink,I.
	112 Land use	Corine landcover		1986-1996	NUTS 3	3.1	V. Schmidt-Seiwert
		Land use typology		2003	NUTS 3	1.1.2.	Christer Bengs/Kaisa Schmidt-Thome/ Hanna Ristisuo
		Urban rural typology			NUTS 3	1.1.2.	Christer Bengs/Kaisa Schmidt-Thome/ Hanna Ristisuo
12 Environment	**121 Pollution**						
	122 Expenditure						
	123 Protection						
	124 Natural hazards	Regional earthquake hazard potential		1998	NUTS 3	1.3.1	H. Kallio
		Degree of vulnerability in Europe (GDP and population density in 50:50 relationship)		1999-2000	NUTS 3	1.3.1	H. Kallio
		Regional earthquake risk (colour code)		1998	NUTS 3	1.3.1	H. Kallio
		Large flood events in Europe (raster data size 25 km)		1996-2002	NUTS 3	1.3.1	H. Kallio
		Regional number of flood hazards		1996-2002	NUTS 3	1.3.1	H. Kallio
		Regional flood hazard potential		1996-2002	NUTS 3	1.3.1	H. Kallio
		Regional flood risk (colour code)		1996-2002	NUTS 3	1.3.1	H. Kallio
		Burnt area grid resolution 1 km		2002		1.3.1	H. Kallio

Theme	Subtheme	Indicator	Description	Time reference	Regional reference	Project	Contact person
		Size of burnt areas (km2) in NUTS3 region		2000	NUTS 3	1.3.1	H. Kallio
		Volcanic eruptions during the last 10 000 years			NUTS 3	1.3.1	J. Jarva
		Particularly hazardous volcanoes				1.3.1	J. Jarva
		Regional winter storm risk (colour code)			NUTS 3	1.3.1	H. Kallio
13 Agriculture	**131 Land use**	Percent of Utilisable Agricultural area, which is arable		1974-2001	NUTS 2	2.1.3	Y Loughrey/A K Copus
		Per cent of Utilisable Agricultural area that is fallow		1974-2001	NUTS 2	2.1.3	Y Loughrey/A K Copus
		Permanent Crops in Least Favoured Areas		1990,1993,1995,1997	NUTS 2	2.1.3	Y Loughrey/A K Copus
		Hectares of Utilisable Agricultural area per holding		1990,1993,1995,1997	NUTS 2	2.1.3	Y Loughrey/A K Copus
		Utilisable Agricultural area which is under perm. crops		1974-2001	NUTS 2	2.1.3	Y Loughrey/A K Copus
		Utilisable Agricultural area which is under perm. grass		1974-2001	NUTS 2	2.1.3	Y Loughrey/A K Copus
		total area which is Utilisable Agricultural area		1974-2001	NUTS 2	2.1.3	Y Loughrey/A K Copus
	132 Farmer Structure	Change in holders		1990-1997	NUTS 2	2.1.3	Y Loughrey/A K Copus
		Farm holders aged <35		1990,1993,1995,1997	NUTS 2	2.1.3	Y Loughrey/A K Copus
		Farm holders aged <65		1990,1993,1995,1997	NUTS 2	2.1.3	Y Loughrey/A K Copus
		Change in old farmers		1990-1997	NUTS 2	2.1.3	Y Loughrey/A K Copus
		Change in young farmers		1990-1997	NUTS 2	2.1.3	Y Loughrey/A K Copus

Theme	Subtheme	Indicator	Description	Time reference	Regional reference	Project	Contact person
	133 Employment	Employed in agriculture forestry and fishing		1977-1997	NUTS 3	2.1.3	Y Loughrey/A K Copus
	134 Livestock	Livestock Units per holding		1990-1997	NUTS2	2.1.3	Y Loughrey/A K Copus
	135 Production	Agricultural Output per AWU		1993,1995,1997	NUTS 2	2.1.3	Y Loughrey/A K Copus
		Agricultural Output per Hectare		1990-2001	NUTS 2	2.1.3	Y Loughrey/A K Copus
		Value of agricultural subsidies per AWU		1990,1999	NUTS 3	2.1.3	T Serra/A K Copus
		Value of agricultural subsidies per hectare UAA		1990,1999	NUTS 3	2.1.3	T Serra/A K Copus
		AWU per 1000 hectares of UAA		1990,1993,1995,1997	NUTS 2	2.1.3	Y Loughrey/A K Copus
		AWU per holding		1990,1993,1995,1997	NUTS 2	2.1.3	Y Loughrey/A K Copus
		Value of fertilizer input per hectare of arable land from FADN		1990,1999	NUTS 3	2.1.3	T Serra/A K Copus
		Value of fertilizers applied per hectare of arable from REGIO		1990-2001	NUTS 2	2.1.3	Y Loughrey/A K Copus
		FNVA per AWU		1990,1993,1995,1997	NUTS 2	2.1.3	Y Loughrey/A K Copus
		FNVA per hectare		1990-2001	NUTS 2	2.1.3	Y Loughrey/A K Copus
		Standard Gross Margin per Agricultural Work Unit		1990,1993,1995,1997	NUTS 2	2.1.3	Y Loughrey/A K Copus
		Standard Gross Margin per holding		1990,1993,1995,1997	NUTS 2	2.1.3	Y Loughrey/A K Copus
		Value added from agriculture forestry and fishery products		1995-1999	NUTS 3	2.1.3	Y Loughrey/A K Copus
14 Social Situation	**141 Poverty**	Typology of lagging regions		2000	NUTS 2, NUTS 3	2.1.1	Spangenberg, M.

Theme	Subtheme	Indicator	Description	Time reference	Regional reference	Project	Contact person
	142 Elderly people						
	143 Standard of Living						
	144 Institutional structures						
	145 Crime						
15 Housing	**151 Buildings**						
	152 Dwellings						
	153 Land prices						
16 Cultural Sites	**161 Inventory**						
	162 Classification						
17 Tourism (tourists, infrastructure)	**171 Arrival and stays**						
	172 Accommodation						
	173 Attractions and facilities						
	174 Enterprises and employment						
18 Public Sector	**181 Institutional Structures**						
	182 Budgets						
	183 Regional Policy	All Structural and Cohesion Fund expenditure		1994-1999	NUTS 2	2.2.1	Kai Böhme / Laura Turró / Silke Haarich and other ESPON 2.2.1 partners
		Pre-Accession-Aid spending (PHARE, PHARE CBC, ISPA)		1999-2002	NUTS 2, NUTS 3	2.2.2	Kirsten Kunkel